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XXXVIII.—STRYCHNOS IGNATII AND OTHER EAST INDIAN AND PHILIPPINE SPECIES OF STRYCHNOS.

(With Plates.)

An account of *Strychnos Ignatii* was published in Hooker's Icones, t. 2212, April, 1892, based on material collected in Samar and Mindanao, Philippine Islands, by Boxall in 1891. Owing to a statement by the collector that there is another species of *Strychnos*, known as St. Ignatius' bean, which is much more plentiful than the plant figured, and that it is the seeds of this species which are exported as St. Ignatius' beans, some uncertainty exists as to the identity of the true *Strychnos Ignatii*.

This uncertainty is increased when the description and figure given by Vidal* are examined, as his plant though depicted with large fruits and seeds is very different from Boxall's both in floral and in foliage characters.

With the kind help of Mr. Elmer D. Merrill, Botanist of the Bureau of Science, Manila, numerous attempts have been made during the past three years to discover whether or not the plant collected by Boxall is the true source of St. Ignatius' beans† and what may be the plant figured by Vidal.

Mr. Merrill has enlisted the help of several collectors in the Philippine Islands, and has also forwarded all the *Strychnos* specimens from the Herbarium of the Bureau of Science to Kew. Mr. Lyon has also kindly sent over specimens and information, but unfortunately there still exist lacunae in our knowledge.

The question as to the exact identity of *S. Ignatii* remains to some extent an open one owing to the collection of a specimen by Mr. Guerrero, which has not reached England and about which

* Revision de Plant. Vasc. Filip. (1886), p. 450.

† The name "Fava de Ignacio" has been applied to plants other than *Strychnos*. *Pterodon pubescens* from Brazil, and other species of this genus as well as the seeds of *Fevillea trilobata* are known by this name, but they appear to have no medicinal use. The name has also been applied to *Anisosperma Passiflora*, Mans., according to Lindley, Vegetable Kingdom, p. 315, and the seeds of one of the *Dalbergiae* (*Leguminosae*) have been sent to Kew under the name of "Ignatia Amara" beans, *see K.B.*, 1898, pp. 103–104.

(20866—6a.) Wt. 118—9, 1125, 9/11, D & S.

Mr. Merrill wrote in May, 1910, as follows :—"Mr. Guerrero brought in a single leaf and detached inflorescence of what is almost certainly *S. multiflora*, Benth., also from Catbalogan [Samar], and his information regarding it was that it also had large fruits that contained poisonous seeds ; the inference is that there are two species that produce the seeds that enter commerce as *Strychnos Ignatii*, Berg." Vidal's drawings closely resemble *Strychnos multiflora*, the common species in the island of Luzon, except as regards the fruits, and some specimens sent by Lyon from Mindanao with leaves and flower buds only, closely resembling the plant figured by Vidal, were thought at one time to represent the missing plant. An examination of the Philippine Herbarium material, however, has led to a further complication since it is now certain that *S. multiflora* occurs not only in Mindanao but also as far south as Ceram, and it is probable, therefore, that it is distributed through the Archipelago. Specimens with both flowers and fruits have been examined which belong to perfectly typical *S. multiflora*, and Lyon's plant no doubt belongs to this species. As yet therefore no definite clue as to the identity of Guerrero's plant has been received.

Two other species allied to *S. multiflora* have also been recognised in the material sent for examination from Mindanao, but in neither case have fruits been seen. They have been described under the names *S. lanata*, A. W. Hill, and *S. dubia*, A. W. Hill. The former of these has leaves very similar to those of *S. multiflora*, and it is just possible that it may be the long-desired plant mentioned by Boxall and Guerrero. In the hairy character of the short-tubed corolla *S. lanata* also shews some resemblance to the picture of *S. Ignatii* given by Vidal. A Bornean species, *S. polytrichantha*, Gilg, with a large globular fruit and short-tubed hairy corolla, resembles *S. lanata* from the Philippines, and it is possible, if this resemblance indicates any real affinity, that *S. lanata* may also have a large fruit containing seeds like those of *S. Ignatii*. Unfortunately, however, this must remain mere conjecture until more evidence has been obtained from the Philippines, so that we must still await the explanation of the statements made by Boxall and Guerrero.

Considerable difficulty attaches to the collection of specimens of *Strychnos*, since flowers and ripe fruits are never found at the same time, and unless particular vines are definitely marked, it is possible that a flowering specimen may belong to one species, and a fruiting specimen to another, although the foliage characters may be very similar. If, however, it should ultimately transpire that two distinct plants yield the St. Ignatius' beans of commerce it would appear, judging from the numerous samples received, that the fruits and seeds must show a very close superficial resemblance.

In attempting to review the evidence and material relating to *S. Ignatii*, it has been necessary to examine and revise as fully as possible the available material from the Philippine Islands and adjacent regions, and to compare it with the material from the Malay Peninsula dealt with by Gamble in "Materials for a Flora of the Malayan Peninsula." Through the kindness of the Director of the Rijks Herbarium at Leiden, the Director of the Herbarium of the Rijks-Universiteit, Utrecht, and the Director of the Botanic Gardens, Buitenzorg, it has been possible

to see the best available material of *Strychnos* from the Dutch East Indies, and to compare these specimens with those preserved at Kew and the British Museum.

Some twenty-four species are enumerated some of which are described as new; a key is given and the geographical distribution of the various species is set out.

Many of the specimens, however, are in an unsatisfactory condition, very few possessing fruits or seeds, and in several cases they consist only of stems and leaves.

A good deal of confusion has been caused in some cases by the somewhat hasty reference of a specimen to a definite species on insufficient material or without consulting the type specimens. Thus the very distinct species (*S. ligustrina*, Bl.) from the Island of Timor, though described and beautifully figured by Blume, has been referred to *S. Nux-vomica*, and a distinct Malayan species (*S. pseudo-tieuté*, A. W. Hill) with a long tubular corolla and large fruits has been referred to *S. Tieuté* from Java. The Fijian *Strychnos*, which up till now has been referred to *S. colubrina*, Linn., has been found to be quite distinct, and has been described as a new species, *S. vitiensis*, A. W. Hill, and other instances might be quoted.

The species of *Strychnos* from the East Indies fall into two groups, one of which appears to be a very natural one, and the other is rather a matter of convenience than a representation of definite affinity. In the first group the species are distinguished by the elongated corollas with long corolla tubes, and large globular thick-shelled fruits containing several, hard, hairy seeds. With the exception possibly of *S. ligustrina* from Timor, the species in this group appear to be very closely related to each other.

Dop in his recent memoir* enumerates seven species with long tubular corollas. Two species from Indo-China are new, namely, *S. rupicola*, Pierre, and *S. spireana*, Dop, and the others are *S. Tieuté* (=*S. pseudo-tieuté*, A. W. Hill), *S. Gauthierana*, Pierre, *S. potatorum*, *S. Nux-vomica*, and *S. Wallichiana*. It is doubtful whether *S. Nux-vomica* is known from the East Indian Islands.

The group with the corolla tube equal to or shorter than the lobes certainly includes more than one sub-group and some isolated forms. The affinities of these different species are discussed in the course of this paper, but it may be mentioned here that some of the groupings appear to be distinctly geographical, such as the *S. multiflora* group in the Philippines, which includes *S. luzonensis*, *S. dubia*, *S. lanata*, *S. ovata*, and *S. Merrillii*, but as the specimens are often so imperfect, it is not safe to discuss relationships in detail without knowledge of the fruits and seeds.

From the list of species which follows it will be seen that the Philippine Islands possess the largest number of species, and Borneo comes next on the list. In the case of Borneo and New Guinea, however, we have probably much to learn, for among the specimens sent to Kew from Buitenzorg there are five specimens, collected by Nieuwenhuis in Central Borneo, only one of which can be named as they are represented by leaves only. Two or three

* Contribution a l'étude des Loganiacées Asiatiques de l'herbier du Museum de Paris, Bull. Soc. Bot. Fr. 1910, ser. 4, x. mem. 19.

of them appear to belong to undescribed and unknown species, and of these specimens two shew some resemblance to *S. multiflora* in foliage characters.

The different species of *Strychnos* appear on the whole to be confined to a particular island or group of adjacent islands, though with allied species a fairly wide geographical area may be covered. *S. multiflora* and its near allies appear to be entirely Philippine ; *S. polytrichantha*, a distinct form, is not known outside Borneo ; *S. ligustrina* is a native of Timor, and has a close ally or varietal form, *S. lucida*, on the adjacent coast of Northern Australia, and is probably represented by a varietal form in Java ; *S. Ignatii* to a few islands of the Philippine group and so on. Other species, however, have a more extended range, and may occur on the mainland. Thus *S. pubescens*, which is found in Borneo, is widely distributed in Malaya and, with *S. axillaris* from the Khasia Hills and *S. Ridleyi* from Malaya, shows close affinity to *S. Horsfieldiana* from Java and *S. palembanica* from Sumatra. *S. laurina*, a Burmese and Malayan species, has been collected in Java, but the specimens appear to have been derived from cultivated plants. *S. acuminata* may also be represented in Borneo, though the latter identification is uncertain.

The most interesting case of distribution is afforded by the species with long corolla tubes, namely *S. pseudo-tieuté* in Malaya, *S. Gauthierana* in Indo-China, *S. Tieuté* in Java, *S. Beccarii* and *S. cuspidata* in Borneo, and *S. Ignatii* in the Philippines. All these species have large fruits with seeds containing strychnine (? *S. cuspidata*), and there can be no doubt that they represent a very natural group. It may be that the presence of these allied species in the various islands and the adjoining mainland is due either to distribution by birds or human agency at some remote period, or to modification of a single species during a long period of isolation.

Geographical Distribution of the East Indian species of Strychnos.

Malaya.

S. pseudo-tieuté.
S. pubescens.
S. laurina.

Sumatra.

S. palembanica.
S. lanceolaris.

Java.

S. palembanica.
S. Horsfieldiana.
S. laurina.
S. maxima (?).
S. Tieuté.
S. ligustrina (?).
S. laurina (? cult.).

Celebes.

S. sp. (near *S. ovata* ?).

Tonkin, Indo-China.

S. Gauthierana.
S. pubescens.
and other species.

Borneo.

S. pubescens.
S. polytrichantha.
S. Beccarii.
S. cuspidata.
S. acuminata (?).
and other unknown species.

Philippine Islands.

S. multiflora. Luzon and other islands.

S. luzonensis, *S. Merrillii*, *S. ovata* } Luzon only.

S. lanata, *S. dubia*, *S. Ignatii* } Islands other than Luzon.

New Guinea.

S. Forbesii.
S. barbata.
S. Kierstingii.

Timor.

S. ligustrina.

Australia, N. Coast.

S. lucida (closely allied to *S. ligustrina*).

Ceram.

S. multiflora.

North Queensland.

S. Bancroftiana (= *S. multiflora* ?).

Fiji Islands.

S. vitiensis.

CLAVIS SPECIERUM.

Corollae tubus elongatus lobis duplo longior.
  Corollae tubus intus glaber.
    Folia trinervia parva ovata 3–4 cm. longa *S. ligustrina.*
    Folia subtriplinervia elliptica vel elliptico-ovata 5·5–8 cm. longa ... ... *S. pseudo-tieuté.*
  Corollae tubus intus versus basin plus minusve hirsutus.
    Folia trinervia.
      Folia elliptica abrupte elongato-acuminata *S. cuspidata.*
      Folia ovata abrupte acuta nervis lateralibus basi curvatis... ... ... *S. Gauthierana.*
      Folia elliptica vel elliptico-ovata abrupte acuta nervis basi cuneatis ... ... *S. Ignatii.*
    Folia subtriplinervia.
      Folia ovata elongato-acuminata coriacea nervis basi curvatis... ... ... *S. Beccarii.*
      Folia elliptica acuminata subcoriacea nervis basi cuneatis... ... ... *S. Tieuté.*
Corollae tubus lobis paullo longior vel brevior; corolla 2–3·5 mm. longa.
  Corollae lobi medio linea pilorum notati.
    Folia ovata vel elliptico-ovata basi rotundata vel rotundato-cuneata.
      Folia superne et inferne pubescentes, tomento ferrugineo conspicue instructa ... *S. pubescens.*
      Folia inferne in costae angulis et costis pubescentes, superne costa basi excepta glabra, tomentum inconspicuum... ... ... *S. palembanica.*
    Folia ovato- vel elliptico-lanceolata basi abrupte cuneata *S. Horsfieldiana*

Corollae tubus lobis paullo longior vel brevior ; corolla 2–3·5 mm. longa—*cont.*

Corollae lobi glabri vel subglabri.

Antherae basi retrorso-villosae.

Folia trinervia vel paullo triplinervia, ovarium parce hirsutum.

Folia 14–20 cm. longa 6–7·5 cm. lata, 5-nervia *S. Forbesii.*

Folia 10–12 cm. longa 3–4·5 cm. lata, 3-nervia *S. acuminata* (?).

Folia triplinervia, ovarium glabrum *S. vitiensis.*

Antherae glabrae.

Folia trinervia... ... ... *S. ovata.*

Folia triplinervia.

Corollae tubus glaber.

Inflorescentiae axillares, folia ovato-lanceolata circiter 7 cm. longa... ... *S. lanceolaris.*

Inflorescentiae terminales, folia ovata circiter 11 cm. longa ... ... *S. villosa.*

Corollae tubus hirsutus.

Corollae tubus lobis aequilongis, ovarium glabrum *S. luzonensis.*

Corollae tubus lobis brevior, ovarium hirsutum *S. Merrillii.*

Corollae tubus lobis paullo longior vel aequilongis ; corolla 4·5–11 mm. longa.

Antherae basi retrorso-villosae.

Inflorescentiae paniculatae longe pedunculatae, folia conspicue triplinervia ... ... *S. barbata.*

Inflorescentiae breviter pedunculatae, folia paullo triplinervia ... ... *S. laurina.*

Antherae glabrae.

Folia trinervia vel paullo triplinervia.

Corollae lobi tomentosi, stylus hirsutus *S. polytrichantha.*

Corollae lobi glabri, stylus glaber *S. dubia.*

Folia triplinervia.

Corollae lobi tomentosi, stylus hirsutus *S. lanata.*

Corollae lobi glabri, stylus glaber *S. multiflora.*

Species non satis notae.

S. acuminata.
S. monosperma.
S. Kerstingii.

Strychnos ligustrina, *Bl.* in Rumphia 1, p. 68, t. 25 ; Rumph. Amb. 2, p. 121, t. 38 ; Mal. Breyn. Ic. 19, t. 5, f. 2 ; A.DC. in DC. Prodr. ix., p. 15.

S. Nux-vomica, Benth., quoad syn. in Journ. Linn. Soc. i, p. 103, non Linn. Cf. etiam, C. B. Clarke in Hook. f. Flor. Brit. Ind. iv., p. 90, in adnot. *S. Nux-vomicae. S. Nux-vomica, L.* β. *depauperata,*

Miq. Flor. Ned. Ind. ii., p. 378 (?). *Strychnos colubrina*, auct. plur. non Linn. nec Wight nec Van Roy. *S. muricata*, Kostel in Miq. Flor. Ned. Ind. ii., p. 380, DC. Prodr., ix., p. 15.

Timor. Spanoghe: Kajve Oelar (19, 911. 32); Timor (*Mappa ligustrina*), *Zippel*; *Zippel*, 52; (*Melieope ternata*, Forst.) *Herb. Zipp.*; Timor, *Teysmann*, 8969 (with fruit); Coepang, *R. Brown* (Ap. 1803), in Herb. Mus. Brit.

Java. A specimen from the Island of Madura, in Herb. Lugd. Bat. collected by De Vriese, with leaves only, resembles the species from Timor and may belong to this species.

There is a specimen at Kew from the Buitenzorg gardens labelled *S. ligustrina*, Bl., and also *S. Nux-vomica*, L., and another collected by Horsfield—labelled *S. maxima*, L. *forma*—at Bidar pait, Java (240), which both agree with a large leaf-bearing specimen at Utrecht labelled *S. Nux-vomica*, L. var. *minor* (*S. ligustrina*, Bl.), collected at Bidura pait, Java. None of these specimens bear flowers, the leaves, however, which are broadly ovate, acute, are grey on the under surface like those of *S. ligustrina*, and only differ in being rather more herbaceous and larger. It is possible, therefore, that *S. ligustrina* occurs in Java as well as in Timor, though as in the case of *S. lucida* from Australia, the Javan form is somewhat different from the type.

This species is a distinct and well-marked form. It was reduced to *S. Nux-vomica*, Linn., by Bentham in Journ. Linn. Soc., i., p. 103 (see also Flor. Brit. Ind., iv., p. 90, in note), but is not really closely allied to that species. It differs from *S. Nux-vomica* in the consistently small leaves, the broadly triangular acute calyx segments, the glabrous corolla tube, the shorter sagittate anthers with longer filaments, the smaller fruits, and the smaller seeds, which are not always of the familiar depressed circular form. According to Blume, the seeds of this species are used as a source of strychnine, and are the equivalent of *S. Nux-vomica* in this respect.

S. ligustrina does not appear to be closely allied to any other East Indian species, but in general appearance it is similar to *S. angustiflora*, Benth., from Hong Kong. There are, however, well marked differences in foliage and floral characters, but the fruits of *S. angustiflora*, with their thin shells enclosing a button-like seed covered with satiny hairs, are very like those of *S. ligustrina*.

S. lucida, *R. Br.* Prod., p. 469; DC. Prodr., ix., p. 16; Benth. Flor. Aust., iv., p. 369, from the north-western Coast of Australia, near Port Darwin, is very closely allied to *S. ligustrina*, and should perhaps rather be regarded as a variety. The leaves are larger and more coriaceous, and the fruits appear to be smaller. It is possible that the Australian plants have been derived in the past from seeds from Timor, brought over either by birds or by natives. No other *Strychnos* in Australia shows any resemblance to this plant.

Strychnos pseudo-tieuté, *A. W. Hill*; species *S. Beccarii*, Gilg, valde affinis sed foliis ellipticis basi acutis floribus minoribus corollis intus glabris antheris brevioribus distinguenda.

Frutex scandens, ramis ramulisque firmis griseo-brunneis, cirris singulis circinatis lignosis. *Folia* subcoriacea, superne vernicosa vel nitentia, elliptica vel elliptico-ovata, apice caudato-acuminata,

basi acuta vel rarius rotundata, 5·5–8·5 cm. longa, 2·8–4 cm. lata, 3- vel rarius 5-nervia, plus minusve triplinervia; petiolus circiter 5 mm. longus. *Inflorescentiae* axillares; cymae pauciflorae, 1·5–2 cm. longae, cymulis 5 3-floris compositae; bracteae ovatae, subacutae, concavae; pedunculi et pedicelli puberuli, pedicelli 1–2 mm. longi. *Flores* albi (fide *Gamble* in Mat. Flor. Mal. Penins.). *Calyx* 1 mm. longus, segmentis ovato-lanceolatis acutis vel subacutis marginibus hirsutis. *Corolla* 8–9 mm. longa, lobis 2–2·5 mm. longis spathulatis obtusis coriaceis glabris, tubo cylindrico extra minute puberulo vel glabro intus glabro. *Antherae* circiter 1 mm. longae, filamentis brevissimis paullo sub sinubus insertis. *Ovarium* ovoideum, glabrum, 1 mm. longum; stylus 7 mm. longus, stigmate capitato. *Bacca* globosa, 4–5 cm. diametro, pericarpium lignosum, 3–4 mm. crassum. *Semina* ovoidea vel elliptica, rotundata, circiter 1·8 cm. longa, 1·2 cm. lata, 6–7 mm. crassa, compressa.—*Strychnos Tieuté*, King and Gamble in Mat. Flor. Mal. Penins., iv., no. 19, p. 831 partim non Lesch. in Ann. Mus. Hist. Nat., xvi., 479, t. 23; *Strychnos Maingayi* var. ? *fructuosa*, C. B. Clarke in Hook. f. Flor. Brit. India, iv., p. 88.

Malay Peninsula. Penang, *Curtis*, 700, 1490; *Ridley*, without number; *Maingay*, 2286 (*K.D.* 1038). Perak: Larut, *King's Collector*, 5348, 10595. Singapore, *Ridley*. Malacca, *Corporal Ali* and *Corporal Hasan*. Without precise locality, *Cantley*, 176.

This species, which appears to be confined to the Malay Peninsula, has been identified in "Materials for a Flora of the Malayan Peninsula" as *S. Tieuté*, Lesch., and a Bornean plant collected by Beccari has also been ascribed to this same species. The latter plant had previously been described by Gilg as a new species under the name of *S. Beccarii*, Gilg in Notizbl. Kgl. Bot. Gart. Berlin, no. 8 (1897), p. 267, and it has also been referred to *S. Tieuté*, Lesch., by Dop in his recent contribution to the study of Asiatic *Loganiaceae* (Bull. Soc. Bot. Fr., ser. 4, x., 1910, mem. 19, p. 16).

S. pseudo-tieuté is closely allied to the other species with long tubular corollas and large fruits. It is, however, easily distinguished from *S. Tieuté*, Lesch., by the relatively small, elliptical, coriaceous leaves, and thinner-walled fruits. *S. Beccarii*, Gilg, appears to be its nearest ally with ovate leaves rounded at the base, and larger flowers; the corolla tube, however, is hairy within, and the anthers are larger than those of *S. pseudo-tieuté*. *S. Gauthierana*, Pierre, has much larger trinerved leaves and larger seeds. The material of some of the species is very imperfect, and it may be found eventually that *S. pseudo-tieuté* and *S. Beccarii* are conspecific, but in the present state of our knowledge, and also taking the geographical separation into consideration it seems better to treat them as distinct species.

Strychnos cuspidata, *A. W. Hill* in Kew Bull., 1909, p. 359.

Borneo. Sarawak: Kuteing, *Beccari*, 1188, 1348; Borneo Central: Ipoe Kajo, *Nieuwenhuis* in Herb. Hort. Bot. Reg.

This plant shows close affinity with *S. Tieuté*, *S. Ignatii*, and their allies. The leaves are elliptical, trinerved, and abruptly acuminate at the apex with a long drip tip, and are unlike those of any other species.

The flowers are similar to those of the allied species, but *S. cuspidata* may be readily distinguished from all others by its characteristic leaves. The fruits are not known. The bark of this species, according to Dr. Nieuwenhuis, is used, as well as that of other species of *Strychnos*, for making arrow-poison in Central Borneo, and according to the same authority the bark of five other undetermined species, of which he only collected leaf-bearing specimens, is used for a similar purpose in Central Borneo, where the natives are still making use of poisoned arrows.

S. Gauthierana, *Pierre* MSS., *P. Dop* in Bull. Soc. Bot. Fr., ser. 4, x., 1910, p. 17. *S. malaccensis*, C. B. Clarke quoad syn. in Hook. f. Flor. Brit. Ind., iv., p. 89, et King and Gamble in Mat. Flor. Mal. Penins., iv., no. 19, p. 829, non Benth.

Indo-China. Tonkin: Nghe-han, Conchank, *Lesserteur*, H.P., 1663 ; Lang-kok, *Balansa*, 2129.

In the Flora of British India, C. B. Clarke referred this species to *S. malaccensis*, Benth. He did this on the evidence of a drawing, sent to Kew by Pierre, representing the leaves only. Had he seen flowers there can be no doubt that he would have pointed out the resemblance of *S. Gauthierana* to *S. Tieuté*, Lesch., as does Dop in his recent study of Asiatic *Loganiaceae*. King and Gamble (Mat. Flor. Malay Penins. iv, p. 829) merely repeat Clarke's mistake.

The seeds of this species show considerable resemblance to those of *S. Ignatii* from the Philippines, though they are smaller and more compressed, but it seems probable that they could and perhaps may be used for the same purpose.

This species was first brought to the notice of Kew in a letter from Dr. Pierre, Director of the Botanic Garden, Saigon, Cochin China, dated June 25, 1877, who also sent a drawing of the leaves. Pierre gave the plant the name *S. Gauthierana*, but published no description. The native name is Hoâng-nan, and a short account of the drug, said to be a cure for leprosy, is given in the Kew Report, 1877, p. 31. In the same letter Pierre refers to St. Ignatius' beans, and suggests that they are only the Lukrabo seeds of commerce (*see* Kew Report, 1877, p. 33), which suggestion, however, proves to be erroneous, as these latter seeds belong to *Hydnocarpus anthelmintica*, Pierre (*see* Pharm. Journ. [3], xv., p. 41).

Loureiro, Flor. Cochin China, 1790, p. 126, refers to this plant under the name *Ignatiana Philippinica*, and suggests that it has been introduced into Cochin China from the Philippine Islands.

De Lanessan, Les Plantes utiles des Colonies Français, Flor. Cochin (1886), p. 767, refers to *S. Gauthierana*, Pierre, as follows :—

"Cette plante grimpante a été découverte dans les montagnes qui séparent l'Annam du Laos à la hauteur du Tonkin méridional. Elle se rapproche par ses caractères botaniques du *Vomiquier* et du *Strychnos javensis*.

"Son écorce, d'un rouge ocreux ou plus rarement d'un gris noirâtre, est très amère et renferme de la *Strychnine* et de la *Brucine*. Elle porte le nom de *Hoang-nan* et sert à traiter la lèpre et les maladies rebelles de la peau."

Dr. Shoemaker (*see* Pharm. Journ. [3], xx., 1889, p. 425) directs attention to the use of Hoâng-nan in skin diseases. . . . He cannot endorse the eulogies on its virtues, but finds it has a stimulant, corroborant, or alterative action upon the cutaneous

glandular systems both perspiratory and sebaceous. . . . He found no satisfactory result with leprosy after three months, nor with erysipelas, but it answered well for skin diseases accompanied by defective nutrition. He remarks that it contains *Strychnine* and *Brucine*, the latter in larger proportion, to which presumably the medicinal properties of the bark are due.

Strychnos Ignatii, *Berg.*, Mat. Med. i, p. 146 (1778); Oliver in Hook. Ic. t. 2212; Tavera in Med. Pl. Philipp. Is. (trans. Thomas), 1901, pp. 171–173; De Lanessan, Pl. Utiles des Colon. Franç. Flor. Cochin. 1886, p. 767; *Strychnos philippensis*, Blanco, Flor. Filip. ed. 2 (1845), p. 61.

Philippine Islands. Mindanao: *Boxall* in Herb. Kew; Lake Lanao, *Clemens*, 895; Central Mindanao, *Lyon*.

Samar: Catbalogan, *Carrothers*, *Guerrero*, *Cullen* (seedlings), 10,835.

Mr. Merrill informs us that the plant is said to be common in the Visayan Islands, especially in Leyte and Samar. It is not known from Luzon though seeds sold in Manila have been wrongly quoted as coming from that island. The history of the synonymy and the difficulties which have attended the exact determination of the source of St. Ignatius' beans has been so well set forth by Oliver in Hooker's Icones, t. 2212, that it is unnecessary to reopen the question again. The difficulty as to whether one or two plants yields the commercial product known as St. Ignatius' beans still unfortunately remains an open one, and must so remain until the floras of the islands of Samar and Mindanao are more thoroughly known. The seeds which reach this country are fairly uniform in character and do not appear to be mixtures, but the seeds of *S. Gauthierana* from Cochin-China are very similar, and it is possible that even if there is only one source of the drug in the Philippines, they may be mixed subsequently by the Chinese.

Loureiro* states that *S. Ignatii* has been introduced into Cochin-China from the Philippine Islands and it is also mentioned by De Lanessan.† Whether this is so or not, it seems clear that *S. Gauthierana* from Cochin-China, though very closely allied to *S. Ignatii*, is sufficiently distinct to be maintained as a species.

The general question of the difficulty of the exact determination of *S. Ignatii* is discussed in the introductory part of this paper and need not be repeated here. Owing to the persistent kindness of Mr. E. D. Merrill it is now quite clear that the plant figured in the Icones (*see* Plate‡) does yield the St. Ignatius' beans of commerce, and the name *S. Ignatii*, Berg., may therefore very properly be retained for this well-defined species. Should it be found eventually that another plant yields similar seeds, as the statements of Boxall and Guerrero and Vidal's picture would lead one to expect, the name *S. Ignatii* given to the plant with the elongated corolla tube need not be disturbed.

Mr. Merrill has recently sent ripe fruits with seeds to Kew with the following information :—

"The material came from the Samar exhibit at the Philippine 'Carnival' just closed, and was labelled 'Igasud,' which appears to be

* Loureiro, Flor. Cochin (1790), p. 126.

† De Lanessan Pl. Utiles des Colon. Franç. Flor. Cochin (1886), p. 767.

‡ Through the kindness of the Bentham Trustees the Plates of *S. Ignatii* and *S. multiflora* published in Hooker's Icones are here reproduced.

the universal Samar name. There were 10 or 12 fruits exhibited, mostly immature. My notes on the one mature fruit secured are as follows: Globose, 10·5 cm. in diameter, somewhat straw-yellow and brown, containing 18 seeds, each seed surrounded by a thick, soft, pulpy covering, but each seed and its pulp distinct from the others, readily separating, the seeds and pulp quite filling the interior of the fruit. Pulp with the odour of a ripe squash, quite the colour and consistency of a fully ripened mango, almost 'luteus' of Saccardo's Chromotaxia. Fresh seeds not at all wrinkled, with a somewhat 'satiny' appearance."

Mr. Merrill has also kindly forwarded to Kew two seedlings of *S. Ignatii* received by him from Dr. G. I. Cullen, District Medical Officer, Catbalogan, Samar, who also writes that "The leaves of this plant are extensively used by chopping them up fine and making a sort of infusion to be used for colic or gastric indigestion; it is also used as a sort of poultice for abscesses prior to the stage of suppuration." The seedlings are in the cotyledon stage and have hypocotyls about 20 cm. long. The cotyledons are sessile, broadly ovate, 13 cm. long, 7–7·5 cm. broad, abruptly acute at the apex, rotund-cuneate at the base, subglabrous, dark green above, light green below, with seven well-marked nerves springing from the base.

As to the exports of St. Ignatius' beans, Mr. Merrill wrote in December, 1909, "Some months ago I was informed that a recent shipment from Laguan Samar to Manila amounted to about 1,000 lbs., and that this was considered to be a very large shipment."

Strychnos Beccarii, *Gilg* in Notizbl. des Kgl. Bot. Gart. Berlin, no. 8 (1897), p. 267.

Borneo, *Beccari*, 1580: Amai Ambit (Liang Kutang), Mandai river, 104° 8′ E., 0° 40 N., *Hallier*, 3153, B (?). *S. Tieuté*, King and Gamble in Mat. Flor. Mal. Penins. iv, no. 19, p. 831, partim; P. Dop in Bull. Soc. Bot. Fr. ser. 4, x, (1910) mem. 19, p. 16, non Lesch.

Both Gamble and Dop appear to have overlooked the fact that Beccari's specimen from Borneo had been described as a distinct species by Gilg in 1897 as no reference to this species is given by them. *S. Beccarii*, Gilg, is closely allied to *S. Tieuté*, Lesch., and to the other long-tubed species. As in *S. Tieuté* the leaves are slightly triplinerved.

One specimen received from the Buitenzorg herbarium collected by Hallier in Borneo, consisting of leaves and fruits, should probably be referred to *S. Beccarii*, Gilg. The leaves are rather larger than those of Beccari's specimens, being as much as 10 cm. long, but they agree closely with those of *S. Beccarii* in the abrupt elongated apex. The thick-walled fruits, which are 5–6 cm. in diameter, with walls about 2 mm. thick, are very like those of *S. Tieuté*. The seeds are ovate-oblong, compressed, 2·3 cm. long, 1·2 cm. broad, slightly pointed at the broader end and rounded at the other. They are narrower and more compressed than those of *S. Tieuté* sent to Kew from Buitenzorg.

Another specimen, with leaves only, received from Buitenzorg and collected by Hallier at Polve Lemukutan, Borneo (367 B), shows resemblance both to *S. Tieuté* and *S. Beccarii*, though rather more markedly to the former species. It appears, however, to be

distinct, having obovate leaves, abruptly elongate-acuminate at the apex, and cuneate at the base, subcoriaceous, glabrous, and scarcely varnished on the upper surface.

It seems clear from the imperfect specimens in herbaria that there must be several undescribed species of *Strychnos* in Borneo.

Strychnos Tieuté, *Lesch.* in Ann. Mus. Hist. Nat., xvi., 479, t. 23 ; Blume in Rumphia, i, p. 67, t. 24. A.DC. in DC. Prodr., ix., p. 13 ; Miq. Flor. Ned. Ind., ii., p. 380 ; Benth. in Journ. Linn. Soc. i (1857), p. 103 ; King and Gamble in Mat. Flor. Mal. Penins., iv., no. 19, p. 831, partim, non Dop in Bull. Soc. Bot. Fr. sec. 4, x., (1910) mem. 19, p. 16, descr. emend.

Folia elliptica, acute acuminata, 8–12 cm. longa, 3·5–6 cm. lata, 3-nervia, paullo triplinervia, superne paullo vernicosa ; petioli 5–7 mm. longi, rami et petioli glabri. *Inflorescentiae* axillares, paniculatae, 2–4 cm. longae, pedunculis lateralibus 3–4 compositis cymis 3-floris gerentibus, pedunculis pubescentibus. *Flores* pentameri. *Calyx* 1·5 mm. longus, segmentis ovatis subacutis minute pubescentibus marginibus ciliolatis. *Corolla* 0·9–1·2 cm. longa, lobis 3–5 mm. longis ellipticis coriaceis subacutis glabris, tubo inferne sparse hirsuto. *Antherae* 1·5–2 mm. longae, glabrae. *Ovarium* glabrum, cum stylo 0·8–1·1 cm. longum. *Bacca* globosa, 4·5 cm. diametro ; pericarpium 1·5–2 mm. crassum. *Semina* numerosa, elliptico-rotundata, pilis apressis instructa, 2·2–2·4 cm. longa, 1·6–1·7 cm. lata, circiter 1 cm. crassa, plus minusve plano-convexa.

Java. *Teysmann* (1867) with flowers ; spec. cult. in Hort. Bog. sub signo x., G. 21. *Dr. H. Hallier* (5, v., 1893) no. C. 110 ; cult. in Hort. Bog. x., G. 46 and 46a ; spec. *Herb. Blume*, with label "conf. Rumphia, vol. i., tab. 24" ; *Herb. Bl.*, "ser. Blume ipse" ; Archipel. Ind., no precise locality, *Teysmann* ; "Tjettek" ? *Reinwardt*, 1599 ; Java Orient., Banjawangei, *Reinwardt*, 1599 (2 sheets both in young condition agree with Horsfield, Kew) ; *De Vriese* et *Teysmann* in Herb. Lugd. Bat. 908, 127–1394. *Zollinger*, 2635 in Herb. Kew. et Herb. Mus. Brit. ; "Tjettek." *Horsfield*, 368 in Herb. Kew. *Horsfield* in Herb. Acad. Rheno-Traj. ; cult. in Hort. Bog. *Pulle* in Herb. Acad. Rheno-Traj.

From the material at Leiden, it is clear that the Javanese specimens, attributed, and rightly so, to this genus, are not conspecific with the specimens from the Malay Peninsula, the leaves are considerably larger and less coriaceous than those of the Malayan plant, and only slightly varnished above. The fruits have thinner walls and the seeds are distinct in being plano-convex, and about 1 cm. in thickness. Specimens of this plant cultivated in the Botanic Gardens, Buitenzorg, have recently been received at Kew, owing to the kindness of Dr. Koningsberger, which fully confirm its specific identity. He informs me that neither the seeds, bark nor leaves are used for any purpose in Java.

Seeds have germinated at Kew. The cotyledons are rotund-ovate, abruptly acute or subacute, 7–8 cm. long, 6·5 cm. broad, 5-nerved from base, bright green and varnished above, bright green below.

S. pubescens, *Clarke* in Hook. f., Flor. Brit. Ind., iv., p. 89 ; King and Gamble, Mat. Flor. Mal. Penins., iv., (19), p. 620 ; Dop in Bull. Soc. Bot. Fr., sec. 4, x., 1910, p. 16.

Penang, Perak, Malacca, Singapore, Indo-China, etc.

Borneo. Sarawak: Mattang, *Beccari*, 2035; Bangermassy, *De Vriese*, x. (1403) in Herb. Lugd. Bat.

The specimens from Borneo appear to agree exactly with those from Malay, and shew close resemblance both to *S. axillaris* and also to *S. Ridleyi*.

S. palembanica, Miq. from Java, is also closely allied to these species. They all shew the interesting character of a well-defined narrow line of hairs across the middle of the inner face of the corolla lobes, and have the anthers bearded at the base (*see* fig. p. 294).

A specimen with large pubescent triplinerved leaves collected by Dr. Nieuwenhuis in Central Borneo (No. 4), recently received from Buitenzorg, probably represents a distinct and undescribed species, but there are no flowers or fruits.

S. palembanica, *Miq.* in Flor. Ind. Bat. Suppl., pp. 227, 551, descr. emend; species *S. axillari*, Colebr., arcte affinis, ovario glabro differt.

Frutex, ramis petiolisque superne pilis appressis instructis. *Folia* ovato-lanceolata vel elliptica, acuminata, basi rotundato-cuneata, 5-nervia, triplinervia, 7·5–10 cm. longa, 3·5–4·2 cm. lata, subtus in angulis inter costam mediam et nervos laterales pilis instructa vel subglabra. *Corolla* 3·5 mm. longa, lobis 2 mm. longis, tubo glabro lobis intus medio linea pilorum horizontali notatis. *Antherae* 0·75 mm. longae, basi retrorso-villosae. *Ovarium* globosum, glabrum; stigmate clavato.—*S. Pilgeriana*, Gilg in Notizbl. des Kgl. Bot. Gart. Berlin, 1897, no. 8, p. 268.

Sumatra. *Forbes*, 3245 in Herb. Lugd. Bat. et Mus. Brit.; Palembang, Moearu Enim., *Hb. Bl.* 3669; in Herb. Lugd. Bat. et Herb. Acad. Rheno-Traj.; without locality *Teysmann* in Herb. Lugd. Bat. (?); without locality *Forbes*, 2955a in Herb. Mus. Brit. (?).

This species is very closely related to *S. axillaris*, Colebr., from the Khasia Hills. Indeed, so close is the agreement that I can find no certain means of separation, and it is also very nearly related to *S. Horsfieldiana* from Java. As no fruits have been collected with any of these species, and in view of the geographical separation, it seems best for the present to maintain Miquel's species, *S. palembanica*, for the Sumatran plant. In the Leiden Herbarium, Blume's plant from Java has been referred to *S. axillaris*, and at Berlin Gilg has named Forbes' plant from Sumatra, *S. Pilgeriana*. The Leiden specimens of Blume's and Forbes' plants are very similar, and closely resemble several specimens in that Herbarium, consisting only of leaves, apparently collected in Java or Sumatra.

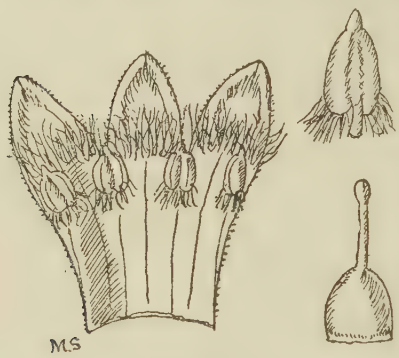
There is a further confusion in the matter as one of the Kew specimens labelled *S. Horsfieldiana* does not belong to that species, but represents a hitherto undescribed species (see *S. villosa*, A. W. Hill).

The original description of *S. palembanica* has been emended after examination of the Leiden material ascribed to *S. axillaris* and Forbes' material from Sumatra. Certain points, such as the hairy stems, the hairs in the axils of the nerves on the back of the leaf, the line of hairs in the corolla lobes and the bearded anthers, have not been exactly defined by Gilg, whose description otherwise applies well to *S. palembanica*.

Miquel describes his species, *S. palembanica*, from leaves and calyx only, but from an examination of the material at Utrecht, Leiden, and the British Museum, it seems practically certain that his plant and Gilg's *S. Pilgeriana*, are identical.

S. palembanica, which may be regarded as the Sumatran form of the "*axillaris*" group, may be distinguished from the Javanese form, *S. Horsfieldiana*, by its larger ovate-elliptic leaves which are rotund-cuneate at the base.

S. Horsfieldiana, *Miq.* in Flor. Ned. Ind. ii., p. 379, descr. emend. *Ramuli* obtuse tetragoni, pube subtilissima sericco-inspersi. *Folia* ovato- vel elliptico-lanceolata, attenuato-acuminata, vetustiora subcoriacea, superne vernicosa, 6·5–8 cm. longa, 2–3 cm. lata, triplinervia, basi acuta vel anguste cuneata, in nervis subtus et costa supra versus basin pube subtilissima sericeo-inspersa; subtus in angulis costae pilis instructa; petioli 5 mm. longi, minute et adpresse pubescentes. *Cymae* axillares, pauciflorae, inconspicuae; pedunculi 5 mm. longi, minute pubescentes. *Calycis* laciniae lato-ovatae, acutuisculae, subpuberae, ciliolatae. *Corolla* 3 mm. longa, extra subpubera, lobi 1·5 mm. longi, intra medio linea pilorum notati. *Antherae* basi retrorso -villosae. *Ovarium* glabrum. *Fructus* ignotus.



Java. Patjitan, *Horsfield* in Herb. Kew (m), Herb. Mus. Brit., Herb. Lugd. Bat. et Herb. Acad. Rheno-Traj.; without precise locality, *Herb. Bl.* 1695 in Herb. Lugd. Bat. 202, 450 (figd.); Archipel. Ind. *Teysmann* in Herb. Lugd. Bat.

Miquel described this species from a small piece of stem bearing two leaves. The flowers closely resemble those of *S. pubescens*, *S. axillaris* and *S. palembanica* in having a line of hairs across the inner face of the corolla-lobes and in the bearded anthers.

The only satisfactory characters by which this plant can be separated from *S. palembanica*, are to be found in the leaves which are narrowly elliptic- or ovate-lanceolate and sharply cuneate at the base. In the angles between the mid-rib and lateral nerves, on the under side of the leaf, a group of fine hairs is present, and the stem and petioles are also covered with short, appressed hairs. The flowers are borne in delicate, axillary, few-flowered cymes and agree closely with those of *S. axillaris* and *S. palembanica*.

Owing to the differences in the foliage between the Javan and Sumatran specimens, it seems best to retain both *S. Horsfieldiana* and *S. palembanica* as species, and to refer the Javan specimens to the former, and the Sumatran to the latter species.

Strychnos monosperma, *Miq.* in Flor. Ned. Ind. ii., p. 381, from the island of Noesa Kambangan on the south side of Java, may be only *S. Horsfieldiana* or a closely allied species, but no specimens have been seen.

Strychnos Forbesii, *A. W. Hill* in Kew Bull. 1909, p. 360.

New Guinea. Sogeri region, *H. O. Forbes*, 216, 230 in Herb. Lugd. Bat. et Herb. Kew.

The specimens at Leiden are in better condition than those at Kew, and the following emendation of the original description is necessary.

Folia ovato-elliptica, apice caudata, subacuta, 14–20 cm. longa, 6–7·5 cm. lata, subtriplinervia.

The veins do not run straight across from the median to the side nerves, but tend to form a meshwork in which an irregular intermediate nerve may be traced.

Strychnos vitiensis, *A. W. Hill*; species distincta nulla arcte comparanda, *S. barbatae*, A. W. Hill, in folii circumscriptione nervibusque et antheris barbatis similis sed ab ea praecipue corollis glabris minoribus facile distinguenda.

Frutex scandens, glaber. *Folia* ovata vel elliptica, acuta, basi cuneata, 10–11 cm. longa, 5 cm. lata, 5-nervia, conspicue triplinervia, coriacea, supra vernicosa; petioli 1–1·5 cm. longi. *Inflorescentiae* axillares, paniculatae, multiflorae, 5–7 cm. longae, e cymis 3–7-floris compositae; pedunculis pedicellisque pilis minutis apressis instructis; pedicellis circiter 1 mm. longis. *Calyx* 0·5 mm. longus, segmentis late ovatis subacutis pubescentibus marginibus hirsutis. *Corolla* 2·75 mm. longa; lobi ovati, acuti, repandi, 1·75 mm. longi cum tubo omnino glabri. *Antherae* subsessiles, paullo sub sinubus insertae, ovatae, basi retrorso-villosae, 0·75 mm. longae. *Ovarium* ovoideum, 0·5 mm. longum, glabrum; stylus 0·5 mm. longus, crassus, stigmate capitato. *Fructus* ignotus.—*S. colubrina*, Seemann in Flor. Vit. p. 166, non Linn.

Fiji Islands. Viti Levu, *Seemann*, 302; *Milne*, 64.

An interesting plant apparently endemic in the Fiji Islands. Its nearest ally appears to be *S. barbata*, A. W. Hill, from New Guinea. It may be easily distinguished from that species by the compact panicles of small flowers with their glabrous corollas and subsessile anthers.

Strychnos ovata, *A. W. Hill* in Kew Bull. 1909, p. 360.

Philippine Islands. Is. Paragua, *Vidal*, 3315.

This is the only species of *Strychnos* so far known from the Island of Paragua midway between Luzon and Borneo. The corolla tube is very short, and the plant is perhaps more nearly allied to *S. multiflora* than to any other species. Fruits and seeds are unfortunately unknown.

It is possible that a specimen from the Island of Ticao (*W. W. Clark*, 20187, Forestry Bureau, 1061), between the southern end of Luzon and Masbate may belong to this species. In this latter specimen the fruits and seeds resemble those of *S. multiflora*, but are much smaller, the fruits being about 1 cm. in diameter with a thin, brown, shining pericarp. Another doubtful specimen at Kew from Luzon, Prov. Albay, Castilla, *Vidal*, 3936, may also belong to *S. ovata*.

Strychnos lanceolaris, *Miq.* in Flor. Ind. Bat. Suppl. pp. 227, 551; descr. emend.

Frutex scandens, caulibus glabris. *Folia* elliptico-lanceolata vel ovato-lanceolata, acute acuminata, basi cuneata, 5–9 cm. longa, 1·5–3 cm. lata, coriacea, superne vernicosa, 3–5-nervia, triplinervia, venis lateralibus numerosis transveris paullo anastomasantibus; petioli circiter 5 mm. longi. *Inflorescentiae* axillares, in racemis vel paniculis 2–2·5 cm. longis dispositae, cymis 4–8 3-floris; pedunculi et pedicelli subhirsuti; bracteae ovatae, concavae, obtusae, circiter 1·5 mm. longae. *Calyx* 1·5 mm. longus, segmentis ovatis obtusis pubescentibus marginibus ciliatis. *Corolla* 2·5 mm. longa, extra minute pubescens, intus glabra; lobi 2 mm. longi, elliptici, subacuti, paullo cucullati, tubo 0·5 mm. longo. *Antherae* ovatae, circiter 0·4 mm. longae, paullo sub sinubus insertae. *Ovarium* globosum, inferne glabrum, superne cum stylo minute puberulum; ovarium 1 mm. diametro; stylus 1 mm. longus.

Sumatra. *Korthals* in Herb. Lugd. Bat. "(Escobaria scandens) 'ser. Miquel ipse'"; Palembang, near Derma Enim, *Teysmann* (with note, specimen citat. Miq. Sumatra, p. 551). Derma Enim, *H.B.*, 3659 ex Herb Univ. (Temeras Akkar) and in Herb. Hort. Bot. Utrecht (no. 15).

The Palembang specimen consists only of two leaves, with a short piece of stem. The leaves agree with Korthals' specimen and measure 8 cm. long by 3 cm. across. A third specimen in Herb. Lugd. Bat. has also two leaves and a piece of stem. Miquel describes the fruit as follows: "bacca depresso-globosa, 4 poll. diam., crasse corticata, polysperma, epicarpio nigrescente albido verrucelloso."—"Species fructu valde insignis, Str. Tieuté praesertim affinis videtur."

A specimen collected at Sungei Kelantan Siak, Sumatra (*Ridley*, 9008), preserved at Kew, consisting of young leaves only, should probably be referred to *S. lanceolaris*.

S. villosa, *A. W. Hill*; species *S. lanceolari*, Miq., affinis, inflorescentiis paniculatis terminalibus villoso-pubescentibus praecipue differt.

Folia ovato-lanceolata vel elliptico-lanceolata basi rotundato-cuneata vel subcuneata, triplinervia, acuta vel attenuato-acuta, glabra, superne vernicosa, 7·5–13 cm. longa, 2·8–5 cm. lata; petioli 0·5–1 cm. longi, glabri. *Flores* numerosi, in paniculas terminales dispositi; pedunculi et pedicelli villoso-pubescentes; bracteae ovatae, dense villosae. *Calycis* laciniae rotundato-ovatae, acutiusculae, extra villosae, marginibus hirsutis. *Corolla* immatura circiter 1·5 mm. longa, extra villosa, lobis 1 mm. longis ovatis acutis intus subglabris, tubo glabro. *Antherae* 0·65–0·75 mm. longae, glabrae vel basi pilis paucis instructae. *Ovarium* globosum, glabrum, 0·5 mm. longum; stylo 0·5 mm. longo.

Java. Wukau. *Horsfield*, 1319 in Herb. Kew.

This plant has been confused with *S. Horsfieldiana* at Kew. It differs in its terminal panicles with their almost woolly covering of hairs; in the glabrous leaves and in the flowers which do not shew the characteristic line of hairs on the corolla segments. On account of the confusion it has seemed advisable to describe the specimen although the flowers are not fully mature.

Strychnos luzonensis, *Elmer* in Leaflets Philipp. Bot. i. (1908), p. 332.—*S. multiflora*, Benth., quoad *Elmer*, 7885.

PHILIPPINE ISLANDS. Luzon: Lucban, *Elmer*, 8251; *Curran* (Forestry Bureau) 19,159 in Herb. Ins. Philipp. (?).

In describing this new species Elmer bases his description on two specimens. One of these, no. 8251, bearing a terminal inflorescence, has ovate-lanceolate leaves rounded at the base. The other, no. 7885, is a fruiting specimen and has elliptical leaves cuneate at the base but bears no flowers. The former appears to be the type of a new species, closely allied to *S. multiflora*. The latter plant appears to be only a narrow-leaved form of *S. multiflora* and there are several other leaf specimens from various collectors which agree with it. These are included under *S. multiflora*. The flowers in the type specimen of *S. luzonensis* are arranged in a terminal panicle and are smaller than those of *S. Merrillii*. The leaves also are more acuminate.

Strychnos Merrillii, *A. W. Hill*; species *S. multiflorae*, Benth., affinis, foliis ovatis et paniculis multo minoribus, corollae tubo breve praecipue distinguenda.

Folia ovata, acuta vel acute acuminata, 4–6 cm. longa, 2–4 cm. lata, 5-nervia, triplinervia, superne vernicosa, nervis marginalibus tenuibus nervis 3 principalibus 3–4 mm. supra basin ortis; petioli 2–5 mm. longi, rami et petioli parce pubescentes vel subglabri. *Inflorescentiae* paniculatae, axillares vel terminales, axillares 1·5–2 cm. longi, pedunculi dense pubescentes, pedicilli brevissimi; bractae ovatae, subacutae. *Flores* pentameri; alabastra lineari-lanceolata, obtusa. *Calyx* 1 mm. longus, segmentis rotundo-ovatis obtusis parce pubescentibus. *Corolla* 2·5 mm. longa, lobis 1·5 mm. longis lineari-lanceolatis acutis, tubi fauce hirsuto. *Stamina* filamentis circiter 0·25 mm. longis; antherae circiter 0·75 mm. longae. *Ovarium* ovoideum, 1 mm. longum, superne hirsutum; stylus 1 mm. longus. *Fructus* immaturus (?) circiter 1·8–2 cm. longus.

PHILIPPINE ISLANDS. Luzon: Prov. Rizar, Bosoboso, *E. D. Merrill*, 2807.

A distinct species though clearly allied to *S. multiflora*, Benth. The small ovate leaves and the small flowers with very short corolla tube serve to distinguish the species but its alliance with *S. multiflora* is shewn by the leaves being triplinerved and by the bearded corolla tube and small fruits.

Strychnos barbata, *A. W. Hill* in Kew Bull. 1909, p. 359.

NEW GUINEA. Soron, Olandite, *Beccari*, 98.

This species is allied to *S. multiflora* according to the structure of its leaves and flowers, but it is easily distinguished by the anthers, which are bearded at the base.

Some imperfect specimens from the Aru Islands may belong to this species.

Strychnos laurina, *Wall.* Cat., 1591. A. DC. Prodr. ix., p. 13. Benth. in Journ. Linn. Soc., i., p. 102; Kurz, For. Flor. ii., p. 166; C. B. Clarke in Hook. f. Flor. Brit. Ind., iv., p. 88 (excl. var.); King and Gamble in Mat. Flor. Mal. Penins., iv., p. 825.

BURMA, MALAYA.

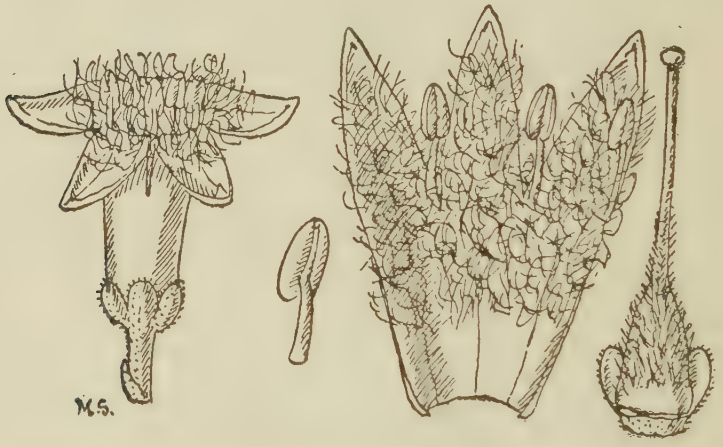
Java. Hort. Bog., *Teysmann* ex herb. Miq. in Herb. Kew. et Herb. Lugd. Bat.; also specimen "Cult. in Hort. Bog." in Herb. Lugd. Bat.; "Java? cult." and Hort. Bog. Cult., *A. Pulle* in Herb. Acad. Rheno. Traj.

The Javanese specimens appear to belong to *S. laurina*, Wall., and one of them in the Leiden herbarium has been so labelled by Solereder. The Kew plant agrees exactly with those at Leiden. The leaves are triplinerved; the anthers are very slightly retrorse-villous at the base, and the ovary and style densely hairy.

Two specimens in the Leiden herbarium agree exactly with the *Teysmann* specimen at Kew labelled "Java, ex herb. Miq."; they consist of leaves and flowers, and bear the label "*St. minor*, Bl., C. 107*b*, Java. Corolla alba, Rankenklimmer, teste Solereder potius *S. laurina*, Wall. Leg. Hallier f. 12, x., 1894, in horto Bog. Cult. in Hort. Bog. sub signo x. G. 44." There are also two good specimens at Utrecht, but in almost all, or perhaps all, cases the material seems to have been obtained from cultivated specimens, and it is doubtful whether *S. laurina* is really a plant native to the Island of Java.

Strychnos polytrichantha, *Gilg* in Notizbl. des Kgl. Bot. Gart., Berlin, 1897, no. 8, p. 267.

Borneo. *Beccari*, 2275, 1190.

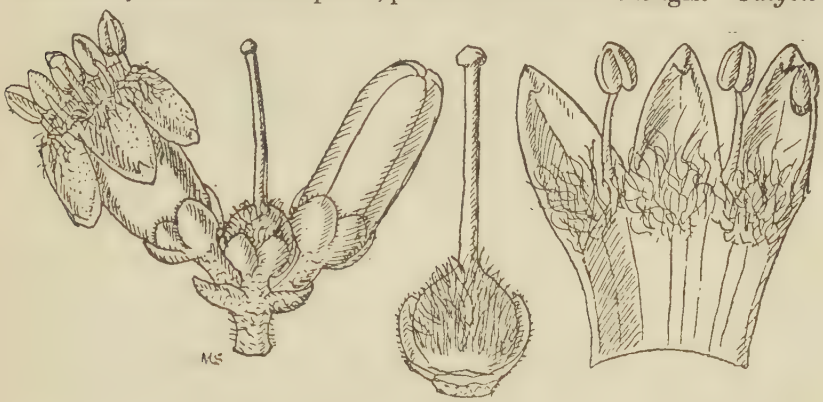


A distinct species with coriaceous trinerved leaves. The flowers have the corolla lobes about equal in length to the tube, and the whole flower is densely hairy inside. In floral structure this species shows some affinity to *S. multiflora*, but the leaves and fruit are quite distinct.

Strychnos dubia, *A. W. Hill*, species *S. multiflorae*, Benth., affinis, sed foliis trinervis, floribus corollae tubo lobis longiore antheris minoribus distincta.

Scandens. *Folia* elliptica, ovata, basi cuneata vel subrotundata, apice breviter acute acuminata, trinervia—rarius brevissime triplinervia—vel sub 5-nervia, nervis marginalibus inconspicuis, 8·5–10·5 cm. longa, 4–5·2 cm. lata, supra vernicosa, subcoriacea; petiolus 5 mm. longus. *Inflorescentia* axillaris, paniculata, multiflora

(*S. multifloro*, Benth., similis), pedunculis et pedicellis fusco-tomentosis ; bracteae triangulari-ovatae, marginibus fimbriatis vel ciliatis. *Flores* in cymas trifloras dipositi, pedicellis 1·5–2 mm. longis. *Calycis*



segmentis ovoideis vel rotundato-ovatis subacutis 1–1·5 mm. longis marginibus ciliatis. *Corolla* 5–5·5 mm. longa, lobis 2 mm. longis ovatis acutis, ad faucem hirsuta. *Stamina* filamentis 0·75–1 mm. longis, antherae 0·75 mm. longae. *Ovarium* globosum, hirsutum, cum stylo glabro 3·5 mm. longum. *Fructus* ignotus.

PHILIPPINES. Mindanao : Davao dist. ; Todaya (Mt. Apo), *Elmer*, 10,958.

This plant shows general affinity with *S. multiflora*, Benth., which has also been recorded from Mindanao, but it differs particularly in the leaves, which are scarcely triplinerved, the nerves arising almost from the base of the leaf, though some variation is shewn. The anthers also are much smaller than those of *S. multiflora*. The plant is of interest since its leaves resemble those of *S. Ignatii* rather than *S. multiflora*, while the flowers, though distinct, are obviously similar to those of *S. multiflora* (cf. p. 282).

Strychnos lanata, *A. W. Hill* ; species *S. multiflorae*, Benth., similis, sed alabastris ovatis subacutis, corolla profunde 5-loba, lobis dense tomentosis, stylo hirsuto differt.

Folia ovato-oblonga, 9–18 cm. longa, 4–9 cm. lata, acute acuminata vel acuta, superne vernicosa, 3–5 nervia, triplinervia, nervis marginalibus tenuibus, nervis 3 principalibus plus minusve 0·5 mm. supra basin ortis ; petioli 0·5–1 cm. longi, rami et petioli glabri. *Inflores-*

centia paniculata, axillaris, pedunculis ultimis et pedicellis minute hirsutis ; pedicelli circiter 2 mm. longi ; bracteae triangulari-ovatae, acutae, concavae. *Flores* pentameri ; alabastra ovata, subacuta. *Calyx* 2 mm. longus, segmentis rotundo-ovatis subacutis vel obtusis marginibus ciliatis. *Corolla* 7–8 mm. longa, lobis 5–5·5 mm. longis superne et corollae fauce dense lanato-tomentosis. *Stamina* filamentis circiter 1 mm. longis ; antherae 2 mm. longae. *Ovarium* ovoideum, 2 mm. longum, hirsutum ; stylus 4 mm. longus, hirsutus ; stigma capitatum. *Fructus* ignotus.

Philippine Islands. Mindanao : Lake Lanao, Camp Keithley, *Clemens*, 747.

This species resembles *S. multiflora*, Benth., in having triplinerved leaves, and a short corolla tube. The leaves, however, have only three conspicuous veins, while in *S. multiflora* there may be five or even seven, and the veins leave the median vein at some distance from the base of the leaf. The pointed flower buds are quite unlike those of *S. multiflora*, as are the longer corolla lobes covered with a woolly tomentum on their upper surfaces. The ovary and style are also beset with hairs, and differ in this respect as regards the style from *S. multiflora*. The plant is described as "a white-flowered vine."

Strychnos multiflora, *Benth.* in Journ. Linn. Soc. Bot. i. (1857), p. 102 ; Hook. Ic. xxiii., t. 2213 ; Vidal Pl. Vasc. Filip., p. 191 ; Miq. Flor. Ned. Ind. ii., add., p. 1080.—*S. luzonensis*, Elmer in Leafl. Philipp. Bot. i. (1908), p. 332 quoad *Elmer*, 7885.—*S. potatorum*, L., var. *multiflora*, Vid. Sinops.,* t. 69, fig. D. ; 'Camotain,' Blanco, Flor. Filip. August., t. 208, ed. corr.

Philippine Islands. Luzon : *Cuming*, 641, 695, 1059, 1482 ; *Loher*, 4110, 4111, 4112, 4113, 4114, 4116, 6483, 6506, 6523, 6540 ; *Vidal*, 1615, 3316 ; *Ahern's Collector* (Forestry Bureau), 2875 (figd.), 3249 ; *Williams*, 348, 350 ; *Merrill*, 1607 ; *Elmer*, 6864, 7820, 7885, 8960 (figd.) ; *Whitford*, 776, 24,037 ; *Alvarez* (Forestry Bureau), 18,486, 18,489.

Mindoro : *Merritt*, 1756, 2102.

Culion : *Merrill*, 561.

Mindanao : *Clemens*, 539, 761 ; *Williams*, 2131 ; *Quadras*, 538. *Lyon*, without number in Herb. Kew.

Dutch East Indies. Ceram : *De Vriese et Teysmann*, Herb. Itin. in Ins. Moluc. (1859–60) in Herb. Lugd. Bat., 908, 127–1351, 908, 127–1382.

The fruits and seeds of *S. multiflora* have not been properly described and figured up to the present and as there is now a good series of specimens the following description has been drawn up.

Bacca globoso-ovoidea, 2–2·8 cm. longa, 1·8–2·5 cm. lata ; pericarpium laeve vel rugosum, vernicosum, 0·5 mm. crassum. *Semina* ad normam 1–2, casu 6, plus minusve orbicularia vel oblonga, circiter 1·8–2 cm. longa, 1·3–1·4 cm. lata, compressa, 1–1·5 mm. crassa ; testa reticulata pilis instructa.

* This figure is very poor ; the leaves are represented with five veins all springing from the base, and the floral details are imperfect.

Strychnos multiflora, Benth

To face page 301.]

The fruits, like the leaves, shew considerable variation in size; in most specimens the fruits have a slightly tuberculate pericarp but sometimes it is quite smooth. Two seeds seem to be the normal number but in the case of large seeds as many as six have been found. Mr. Merrill writes that the largest seeds seen by him were not quite mature and slightly exceeded 2·6 cm. in diameter; they apparently contained but one or two seeds.

The flat seeds have a curiously reticulated surface and though hairs are present they do not cover the seed with the satin-like covering which is so characteristic of the seeds of *S. Nux-vomica* and other well-known species.

Strychnos multiflora has been regarded as the species typical of the island of Luzon, but from the specimens preserved in the Philippine Islands Herbarium and from specimens sent to Kew by Lyon, a plant apparently identical with *S. multiflora* occurs also in Mindanao. It is unfortunate that fully developed flowers have never been collected with the specimens from Mindanao but only large buds. The shape and venation of the leaves however is that of *S. multiflora*, and the floral structure also agrees, but in view of Vidal's picture and Mr. Guerrero's statement (*see* pp. 281–282), it is unfortunate that better material is not forthcoming with definite information about the fruits. Three of the specimens from Mindanao (*Clemens*, 761), (*Williams*, 2131), (Quadras, 538), have fruits and the fruits are quite similar to those of *S. multiflora* being globular and small and shew not the slightest resemblance to the large fruits of St. Ignatius' bean.

The specimen from Ceram bears leaves and a seed which agree with those of typical *S. multiflora*. Some difficulty has arisen over the fruiting type of Elmer's *S. luzonensis* which appears to be only a narrow-leaved form of *S. multiflora*. The flowering and fruiting types are without doubt distinct plants and have accordingly been separated; the fruiting specimen has been placed under *S. multiflora*.

Strychnos Bancroftiana, *F. M. Bailey*, from Mulgrave River and Tringilburra Creek near Cairns in North Queensland, is another

plant which possibly should be placed under *S. multiflora*. The specimen consists only of leaves, fruits and seeds which resemble those of *S. multiflora*. Taking these characters into consideration as well as its position near the coast it seems possible that it may have been introduced into Australia and may not be a native plant, especially as it shows no particular affinity to *S. psilosperma*, F. Muell., the endemic Queensland species.

There are also two specimens, consisting of leaves only, collected by Nieuwenhuis in Central Borneo which may be found to belong to *S. multiflora* or some closely allied species.

Species Imperfectly Known.

S. acuminata, *Wall.* Cat. 1593 in part. C. B. Clarke in Hook. Flor. Brit. Ind. iv. p. 86 (?).

Borneo. Bangarmassing, *J. Motley*, 902.

A specimen in bud only, with subtriplinerved leaves 10–12 cm. long, 3–4·5 cm. broad, acute, rounded-cuneate at the base, glabrous. Corolla about 3 mm. long with lobes about 2 mm. long, the throat of the corolla and base of the lobes hairy. Anthers bearded at the base, and style and ovary hairy.

Has been referred to *S. acuminata*, Wall., by C. B. Clarke in the Kew Herbarium, but the determination is doubtful.

Strychnos sp.

North Celebes. Gorontalo, *Riedel* in Herb. Kew.

Two sheets of leaves and fruits only. A plant from S.E. Borneo in Herb. Lugd. Bat. (*Winkler*, 2570), closely resembles this plant, and in its leaves and fruits the Celebes plant shows some similarity to *S. ovata* from the Philippines.

Strychnos sp.

Borneo. Sarawak, *Beccari*, 839.

Resembling *S. pubescens*, C. B. Clarke, in general appearances, but the leaves are trinerved. The flowers are imperfect. The material probably represents a new species.

Strychnos monosperma, *Miq.* in Flor. Med. Ind. ii. p. 351.

Java. Noesa Kambagan Is. No specimen has been seen, probably belongs to *S. Horsfieldiana*, 9, v.

Strychnos Kerstingii, *Gilg* et *K. Schum.* in Fl. Deutch. Sud See, p. 498.

New Guinea. Kaiser Wilhelm's Land, *Lauterbach*, 2401.

Species described from leaves and fruits only. Leaves oblong-lanceolate, attenuately and obtusely acuminate, trinerved; fruits one-seeded. Said to be very distinct in the shape of the leaves and small yellow fruits.

A. W. Hill.

XXXIX.—NOTES ON TREES SUITABLE FOR EXPERIMENTAL FORESTRY. II. AMERICAN BROAD-LEAVED TREES—*continued.*

W. Dallimore.

The Sugar Maple (*Acer saccharinum*, Wangenh.).—The important place occupied by this species amongst commercial timbers, warrants it a trial amongst possible timber trees in the British Isles, although it is of less vigorous growth than the Oregon and Norway Maples and the Sycamore. Hough, "American Woods," i, pp. 48–49, describes it as being one of the most useful trees of Canada, New England and the Middle States, its timber being employed for furniture, interior finish of houses, flooring, ship-building, shoe-lasts and wooden-ware. Further references to the uses of the wood are made in "Forest Planting Leaflet," Circular 95, U.S. Dept. of Agriculture, as follows :—"The wood of the sugar maple is heavy, strong, dense, and very hard, but not durable in contact with the soil. It is susceptible of fine polish and is used in large quantities for interior finish, floors, musical instruments, furniture, wooden ware, vehicles, cooperage, and novelties. The wood stands alternate wetting and drying well, and is therefore one of the best for the manufacture of washing machines. 'Curly' and 'Bird's-eye' maple obtained from this species, are desirable for finishing and cabinet work. The wood makes charcoal of unsurpassed quality, is a source of wood alcohol, and has a very high fuel value."

"The chief value of the sugar maple for economic planting is as a sugar producer. The sap contains from 2 to 3 per cent. of sugar. Three to 9 per cent. of the total sap content of the tree may be utilized for sugar-making without dangeronsly lessening the tree's vitality."

The species is of slow growth in America, its average height growth being about one foot a year for the first 30 or 40 years and less afterwards. It occurs in pure stands and also in mixed woods. Being a good shade-bearer, American foresters employ it for planting beneath light-demanding subjects when it is to be grown for timber, and recommend its association with such trees as red oak, hickory, and yellow poplar. It is said to be unadapted for poor, dry ground, and to be sensitive to severe frost and drought, but is reported to stand wind, snow and ice well. When grown for sugar production it is planted wide so that the crowns may have plenty of room for development. An account of the growth of the tree for sugar production is to be found in "Bulletin No. 59," of the Bureau of Forestry, U.S. Dept. of Agriculture.

The average height of American grown trees is given as about 80 feet and the trunk diameter as 3 feet. It sometimes, however, grows 120 feet high with a diameter of 5 or 6 feet. According to the above mentioned forest circular it often forms from 25 to 75 per cent. of the total forest stand in the northern pine belt of America. A great deal of timber is imported into the markets of the British Isles, some ready worked in the form of flooring blocks for factories, work-rooms, &c., mangle rollers and other articles, and some as trunks and planks.

A small plantation of sugar maple was made a year or two ago on the Earl of Plymouth's estate at St. Fagans in South Wales, but it is yet too young for an opinion to be formed as to how it is likely to succeed.

The Red Maple (*Acer rubrum*, L.).—This is another species which provides a certain amount of the maple wood of commerce, and it is one which thrives in this country. It is found in Canada and the Eastern United States, as a tree up to 80 feet high with a trunk diameter of 4 feet. Its best proportions are attained along the banks of lakes and streams, where it often grows in ground of a swampy nature which is subject to occasional flooding. That it will grow on ordinary land is shown by the fine trees which are sometimes met with in this country, and growing in the hot sandy soil of Kew several trees of fair development are to be seen. A very fine tree is growing on the bank of the lake at Whitton Park, Hounslow.

Hough, "American Woods," iii., pp. 15–16, describes the wood as moderately heavy, hard and elastic, close-grained, compact and taking a very smooth polish. He adds that it is valuable for the manufacture of shovels, bowls, and small wooden-ware generally. The curly grain peculiar to the wood of *A. saccharinum* is sometimes developed in this wood also and such examples are esteemed for cabinet making. According to Hough, the bark also is of importance, for, by boiling it with sulphate of iron and alum a bluish-black dye is obtained. Boiled with alum alone the bark is said to produce a lasting cinnamon-colour dye.

The Hickories (*Carya* spp.).—Hickory wood of commerce is furnished by several species of *Carya* which may be grown in certain parts of the British Isles. The hickories are closely related to the walnuts and share with those trees the character of producing edible nuts. In America, the nuts of some kinds are of such importance that plantations of trees are made solely for their production. Pecan nuts, the produce of *Carya olivaeformis*, are imported into the markets of this country and are used for dessert. Hickory wood has a high reputation for strength and elasticity and is used for many of the purposes to which ash is put, such as handles for axes and other tools and for agricultural implements. It is also in request for carriage building and is popular in America for the manufacture of trotting sulkeys. In fact for the latter purpose it is said to be better adapted than any other known wood (*see* "Garden and Forest," September 25, 1889, p. 460).

Although good trees of a few species are to be found in the British Isles and young examples make satisfactory progress at Kew, the hickories have not been planted freely enough to warrant extensive plantations prior to experimental work. They are included among the trees which are under trial at Avondale in Ireland but the plantation is only of recent formation. Elwes, "Trees of Great Britain and Ireland," iii., p. 616, doubts their suitability for forest planting in the British Isles and supports his opinion with observations on the behaviour of various species which have been tried on the Continent. As far as he is aware, none of the trials which have been made in France, where the trees were introduced on a large scale by Michaux, 100 years ago, have been

successful, and he could not hear that any of the trees which were planted near Paris are now alive. But, as we are faced with the fact that no systematic trials have been carried out in this country, the possibility remains that one or more species may form useful timber trees and enable us to grow timber which has now to be imported.

In American literature, the Caryas are usually referred to under the name of *Hicoria*, and in the "Silva of N. America," vii., the various species are described under that generic name.

The following species are worthy of trial :—

The Shell-bark or Shag-bark Hickory (*Carya alba*, Nutt.).—The wood of this species is highly esteemed by manufacturers, and it is said to be one of the most valuable kinds of hickory. The common names of shell-bark and shag-bark refer to the habit which old trees have of shedding their bark in rough scales. This habit enables timber merchants to single out felled trees belonging to the species from amongst inferior kinds. Hough, "American Woods," ii., p. 26, refers to it as a very valuable wood for agricultural implements, the wheels and runners of vehicles, axe-helves, baskets, &c. He also says that its nuts are an important article of commerce and that most of the hickory nuts of the market are produced by this species.

Although rarely found as a pure forest, it covers an extensive area in America, for it is met with from the northern shores of Lakes Erie and Ontario, throughout the Middle States to Florida, N. Alabama, &c. Its associates, according to the "Forest Planting Leaflet," Circular 62, are other hickories, oaks, maples, ashes, chestnut, basswood, and yellow poplar. *Carya alba* grows best in a deep, rich and moist loam, and the above mentioned circular recommends that it should be planted in good soil in valleys and on fertile hill-sides. It is doubtful whether it would prove successful on shallow soil, for like other hickories, it is a deep-rooting tree. As it is a light-demanding tree, it should be planted as a pure plantation or be mixed with some shade-bearing subject such as beech, hornbeam, or sugar maple.

According to American reports it coppices well, and the young growths are used for splitting to make into baskets, barrel hoops, &c.

On account of young trees being difficult to transplant, it would be a good plan to sow the seeds where the trees are to grow, taking care first, to roll them in red lead to secure them from attacks by mice. If sown in a nursery, the young trees ought to be transferred to permanent quarters when not more than two years old. When planted as a mixture, the hickories might be placed about 8 feet apart each way. Attention to weeding will be required for two or three years after the formation of a plantation, for the young trees do not get on very fast in the early stages, and might easily be smothered by coarse vegetation.

One of the largest trees in the country is growing in the arboretum at Brocklesby Park, Lincolnshire. Its height last year was 79 feet, and its girth 4 feet 10 inches, at 5 feet from the ground. Other large trees referred to in "Trees of Great Britain and Ireland," iii, p. 603, are to be found at Botley Hill, Hants, and at

Boynton Hall, Bridlington, Yorks. At the former place a tree about 70 years old measures 75 feet in height by 5 feet 4 inches in girth, with a bole of 30 feet, while three trees on the latter estate are 50 feet by 7 feet, 40 feet by 4 feet, and 25 feet by 6 feet, respectively. Its average height in America is 70 to 90 feet, with a girth of from 6 to 10 feet, but trees have sometimes been found up to 150 feet high, with a girth of 15 feet.

The Bitter-nut (*Carya amara*, Nutt).—Although the timber of this species is considered by wood-workers to be inferior to that of the shell-bark hickory, it is used for many of the same purposes. Hough, "Handbook of Trees of the Northern States and Canada," p. 53, says that it is less fastidious than other species with regard to soil, and that it is more uniform in distribution, and probably the most abundant representative of its genus. Its maximum dimensions are attained in southern New England, where it grows to a height of 100 feet, with a girth of 10 or 12 feet. Usually, however, it is found between 70 and 80 feet high, and up to 9 feet in girth. There appears to be no reason to doubt that it will succeed in England, for Mr. Elwes has recorded several well-grown examples in "Trees of Great Britain and Ireland," iii, p. 601. A tree at Bute House, Petersham, when measured, in 1903, was 76 feet high, and 7 feet 5 inches in girth. At Arley Castle, the tallest of five trees was 72 feet high by 4 feet in girth, while at Barton, Bury St. Edmunds, two trees measured, in 1905, 80 feet by 5 feet 4 inches, and 74 feet by 7 feet 6 inches, respectively. The nuts, on account of their bitter taste, are reputed to be valueless, and squirrels, even, are said to ignore them so long as other food is to be found.

The Pig-nut (*Carya porcina*, Nutt.).—This is considered to be one of the hardiest of the hickories, and it ought to prove a useful one for forest planting. Hough, "Handbook of Trees of the Northern States and Canada," p. 65, says that it is found at higher altitudes than any other hickory inhabiting the uplands and ridges of the Northern States. Its average height is from 80 to 100 feet, and its girth from 9 to 12 feet. Its timber is of good quality, and is used for many purposes where toughness and strength have to be combined with lightness. The nuts are not considered so important as those of other species in America, on account of their thick shells and small kernels.

A tree 73 feet high, with a girth of 6 feet 2 inches, at 5 feet from the ground, may be seen near the south end of the Temperate House at Kew. It fruits freely most years, but many of the nuts are not fertile. From the way in which this tree has grown in poor sandy soil, there can be little doubt about its success in ground of better quality, if planted under forest conditions. It is probable that its chances as a forest tree in England could be gauged most satisfactorily by planting it alongside a plantation of ash, under exactly similar conditions.

The King-nut or Big Shell-bark Hickory (*Carya sulcata*, Nutt).—In many respects this species may be looked on as a counterpart of *C. alba*. It has the same peculiar habit of shedding its bark in long plates or strips, and the wood is of equally good quality. Attaining a height of 100 or 120 feet, with a diameter of from 3 to rarely 4 feet, Sargent, "Silva of N. America," vii, p. 159,

says that its best dimensions are attained on rich, deep, bottom lands which are inundated during several weeks each year. The orange colour of the young branches is given as a ready means of distinguishing the tree from other kinds. Hough, "American Woods," iii, p. 64, gives a description of the wood and refers to the nuts, which are said to possess a delicious flavour, and always to find a ready market. It might be tried under similar conditions to *C. alba.*

The Mocker-nut Hickory (*Carya tomentosa*, Nutt.) Like several of the other hickories this species produces timber of first-rate quality, whilst its nuts constitute such an important article of trade that it is grown for their production as well as for timber. It is found between 90 and 100 feet in height with a girth of from 9 to 12 feet, inhabiting the middle and southern States from the coast westwards to Nebraska and Kansas. Its maximum growth takes place in rich upland valleys and on gentle slopes; towards the more northerly parts of its range, it is confined to the neighbourhood of the coast. The best specimen at Kew may be seen near the Azalea Garden. It was planted in 1872, and is now 49 feet high, with a girth of 2 feet 5½ inches at 5 feet from the ground. The leaves of many of the Caryas, and of this one in particular, are very effective in autumn, for they assume a rich golden colour previous to falling. This desirable quality suggests them as good subjects for massing in places where landscape effect has to be studied.

American Oak (*Quercus* spp.). Although some 50 or 60 species of *Quercus* are natives of N. America, very few are ever likely to enter largely into competition with British oaks in our woodlands, for, generally speaking, the wood is no better than English oak, if as good, and the same quality of land would be required to grow it as is necessary for the production of good English oak. The best American oak is produced by a number of species which are known collectively as "white oaks." White oak timber holds an important position amongst United States timbers, and a good account of its uses, &c., is to be found in "Forest Service Circular," 105, of the U.S. Dept. of Agriculture, "White Oak in the southern Appalachians." It is there stated that its annual cut is over 2,000,000,000 board feet, and that it forms 49 per cent. of the total annual cut of hardwoods in the southern Appalachian region. *Q. alba* is the most important tree in the group, which includes such species as *Q. macrocarpa* and *Q. bicolor.* The principal uses for white oak appear to be ship and waggon building, furniture, cross-ties for railroads and staves for barrels. White oaks, as a rule, grow unsatisfactorily in this country, hence the necessity for exercising caution in the formation of plantations.

Other classes of American oak are known as "red oak" and "black oak." Some of the species which produce these classes, grow satisfactorily in this country, but the timber is inferior to that of the white oak, and might be classed with that of the Turkey oak for quality, rather than with that of the British species.

The following species, however, deserve a trial in our woods.

The Burr Oak (*Quercus macrocarpa*, Michx.). It is probable that this species will prove more satisfactory than others of the

white oak group for cultivation in this country, though in special places where the atmosphere is moderately humid, and the ground good and moist; the "white oak," *Q. alba*, L., and the "swamp white oak." *Q. bicolor*, Willd., may prove a success. The burr oak grows to a large size in Central N. America, its average height being from 80 to 90 feet, with a diameter of 3 to 4 feet, though under very favourable conditions specimens have been noted up to 170 feet in height, with a diameter of from 6 to 7 feet. "Forest Planting Leaflet," Circular 56, U.S. Dept. of Agriculture, deals with this species, and from it the following notes have been extracted. "The burr oak is one of the most valuable hardwood trees in North America. The wood is heavy, hard, very strong and durable. In the markets it is not, and need not be, distinguished from white oak, and it is used for the same purposes. The heartwood makes especially good fence posts and railroad ties, but the sapwood does not last long in the ground. It is best suited to deep, rich, river-bottom soils. It will maintain itself in poorer upland localities, but it is recommended for planting only where the soil is fairly good, moist, and well-drained, and where protracted droughts are infrequent. It is rather intolerant of shade, and will not thrive beneath the crowns of taller trees. The rate of growth, except under the best conditions, is somewhat slow, and is about like that of white oak. Neither grows so rapidly as red oak. The burr oak is subject to comparatively few pests or diseases." In America, regeneration takes place by growths from the stools of trees which have been carefully felled, and also from seeds which are often sown on the ground the trees are to occupy. A full description of this and other white oaks may be found in vol. viii. of the Silva of N. America.

The Red Oak (*Quercus rubra*, L.).—This strong-growing species thrives in many parts of the country, increasing in size at about the same rate as the Turkey oak. Timber from British-grown trees is reddish in colour and of attractive appearance, but it lacks the strength of good English oak. American reports of the timber describe it as heavy, hard, coarse-grained, strong, and moderately durable. It is said to be inferior to white oak where great strength is required, and not to last so long in the ground, but to work easier and to be often preferred for interior finish and for cabinet work. As a rule it is considered to be better than other kinds of red oak, and the best qualities are not kept separate from white oak for many purposes. (*See* "Forest Service Circular," 58, U.S. Dept. of Agriculture.) In the sandy soil of Kew it makes satisfactory progress. When grown in the open the head is inclined to become very wide in comparison to the height and even in a thin wood the same thing is apparent, therefore, it is probable that the best results would be obtained by planting it thickly with beech or some other shade-bearing tree for a companion. The largest tree at Kew has a girth of 13 feet 10 inches at 5 feet, and is now about 55 or 60 feet high. It has, however, been lopped. Younger trees range up to 85 feet high with trunks up to 6 feet in girth. Two vigorous examples were noted recently in the gardens at Ancrum House, Roxburghshire, the residence of Miss Scott. The larger specimen was 55 feet high, and 7 feet 6 inches in girth at 5 feet from the ground.

With reference to the growth of red oak in America, the aforementioned circular gives the following information :—

"Red oak is best suited to porous, sandy or gravelly clay soils. In this requirement it is intermediate between the white oaks and several of the black oak group. It requires well-drained soil always, but does not do well where the air is very dry. The tree is intolerant of shade, except when very young, and must always be allowed to keep its crown free. Red oak surpasses all other oaks in the rapidity of its growth, and is therefore a good tree to plant where conditions are suitable. Like the other oaks, this species is not subject to disease nor to serious insect attacks, and is rarely overthrown by wind."

Under normal conditions, *Q. rubra* grows from 70 to 90 feet high with a trunk diameter of from 2 to 4 feet, but it has been recorded up to 150 feet high with a diameter of 5 feet.

The Cottonwood (*Populus monilifera*, Ait.).—The usefulness of the better grades of poplar wood for box-making and for paper pulp is such as to warrant extensive plantations of those kinds which grow rapidly and produce good timber. *P. monilifera*, or *P. deltoidea* as it is often called, is likely to prove one of the best of the species for it occupies an important place amongst American woods. "Circular 47," of the Forest Service, U.S. Dept. of Agriculture, deals with the strength of packing boxes made from various kinds of wood, and of eight sorts mentioned for medium sized boxes and six sorts for large boxes, cottonwood was found to be the strongest. For small boxes cottonwood was second of eight. The kinds tried were cottonwood, red gum, yellow pine, New England white pine, Western hemlock, Western spruce, Michigan white pine, and North Carolina pine.

Populus monilifera is widely distributed from Quebec, southwards through the Atlantic States to western Florida and westward from Alberta, along the Rocky Mountains to New Mexico. Like other poplars it is of rapid growth when planted on moist ground, and is an excellent tree for low ground which is subject to flooding. Its average height is given as from 75 to 100 feet and the diameter of the trunk as from 2 to 3 feet. The United States "Forest Circular," 77, refers to the economic uses of the wood as follows:— "Paper pulp, boxboards, backing for veneer, the unexposed parts of furniture, wagon boxes, interior woodwork and boarding, and fuel are the principal products for which the wood is used. The increased value which the tree is gaining for these uses, coupled with the ease and rapidity with which it can be grown, renders it one of the important species for commercial planting in the Middle West. Its fuel value in some regions is especially high, since it furnishes a greater amount of wood in a given time than other species. In proportion to volume, the relative heat-production is, however, low."

P. monilifera would need to be planted as a pure stand, or with spruce, on moist ground. It would probably grow on high, dry ground, but it is doubtful whether it would ever prove a commercial success. Cuttings form the most satisfactory method of increase. These may either be dibbled into permanent positions or be rooted

in a nursery. Male flowering trees are preferable to female, for when the latter are fruiting, the cottony fibre which surrounds the seeds is apt to become objectionable.

Populus Eugenei, Simon-Louis.—Although there are several species of poplar which are, or may be, grown successfully in this country, experiments might well be directed towards ascertaining whether some of the hybrids, on account of more robust growth, would not be more profitable. Cultivated as ornamental trees they are certainly more vigorous than their parents and it is quite possible that they would produce a given amount of timber of equal or better quality in a shorter space of time. The hybrids are probably of natural origin, but, until recently, they have been considered to be varieties of certain species, or have been distributed as good species. Their identity has, however, been worked out by Henry and others, and they have been proved pretty conclusively to be hybrids between the European *P. nigra*, L. and one of the American species, *P. monilifera*, Ait., or *P. angulata*, Ait.

P. Eugenei is likely to prove one of the best of these hybrids for forest planting, for it is of sturdy, pyramidal habit, with a narrow head of small branches. It grows rapidly and will apparently arrive at a marketable age in 30 or 40 years from the time of planting. Growing in poor sandy soil at Kew, which often becomes very dry—by no means ideal conditions for poplars—a tree planted in 1888 is now 95 feet high, 7 feet in girth near the ground, and 4 feet 10½ inches at 5 feet high. It is a male plant and would of course have to be increased by means of cuttings. Pure stands on moist ground would doubtless be more economical than mixed woods and the trees might be planted from 3 to 4 feet apart each way. Like other poplars it is well adapted for the banks of lakes and streams, hence its suitability for plantations on marshy ground.

P. serotina, Hartig, *P. regenerata*, Hort., *P. marilandica*, Bosc. and *P. robusta*, Schneider, are other vigorous-growing hybrids, which, when grown in the open, develop wide-spreading heads of branches. Some of them are already in cultivation included under the general term of black Italian Poplar. All are worth trying in experimental blocks.

XL.—DIPENTODON.

A New Genus of Uncertain Systematic Position.

S. T. Dunn.

In 1898 Mr. Augustine Henry sent to Kew from Mengtze in Yunnan, where he was then stationed as Commissioner of Customs, specimens of the foliage and young fruits of a small tree growing in the forests which covered the mountains to the south of that town. The specimens exhibited such unusual floral characters that there arose some doubt, which further study failed to remove, as to what Natural Order or even as to what Series of the Dicotyledons could be expected to contain its allies. The material was, in fact, not sufficiently complete to enable the question to be decided until, among some specimens from the Province of

Kweichau communicated to Kew by Mgr. Léveillé, Perpetual Secretary of the Academie Internationale de Géographie Botanique, was found excellent and abundant material of the same species in flower and fruit.

Even with the complete series of specimens now available, approximately close allies have not been found, but it has been placed provisionally, as a new genus, among some anomalous monotypic genera in *Celastraceae*. The name *Dipentodon*, proposed for it, refers to the most remarkable character possessed by the flowers in the exact similarity of the calyx teeth and petals (if I rightly call them so) and their insertion so nearly in one whorl that the appearance is given of a ten-toothed perianth.

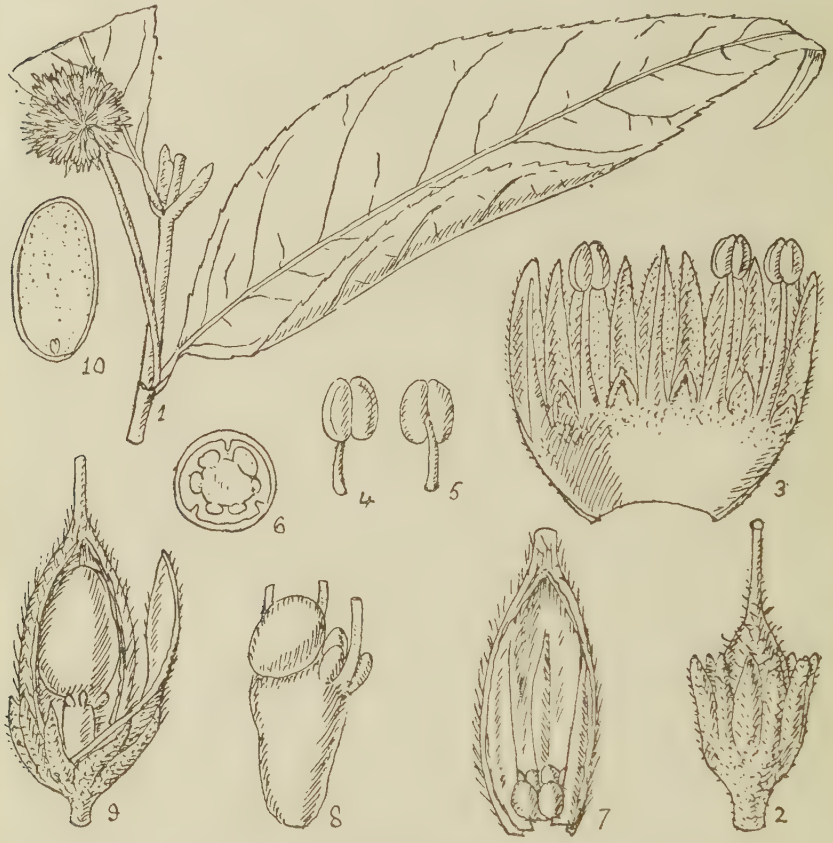
Dipentodon, *Dunn*, gen. nov. [Celastraceae-Elaeodendreae ?]; ob ovarii indolem *Tripterygio*, Hook. f., comparabile.

Calyx 5-fidus; tubus urceolatus, disco adhaerens; lobi erecti, ligulati, aestivatione aperti. *Petala* 5, calycis lobis omnino similia. *Stamina* 5, disco inserta, calycis lobis opposita, glandulis alternantia, filamentis filiformibus, antheris didymis. *Ovarium* liberum, basi 3-loculare, apice 1-loculare, in stylum integrum attenuatum; ovula in loculis imperfectis 2, erecta. *Capsula* septicide dehiscens, obtuse 3-gona, stylo terminata, coriacea, septis evanidis 1-locularis. *Semen* erectum, testa carnosa. *Embryo* minutus, intra basin albuminis situs, rectus, cylindricus, axilis.—*Arbores* parvi. *Folia* alterna, petiolata, serrulata, stipulata. *Umbellae* parvae, pedunculatae, axillares.

D. sinicus, *Dunn* (species unica).

Arbor parva, ramulorum cortice siccitate nigra. *Folia* alterna, lanceolata, in acumen longum gradatim angustata, basi breviter acuminata, ad 14 cm. longa, per totam marginem regulariter calloso-serrulata, papyracea, primum in costa subtus pubescentia, mox praeter basin glabra, tandem omnino calva, nervis utrinque 7–9; petioli 3–6 mm. longi; stipulae membranaceae, lanceolatae, 5–7 mm. longae, caducissimae. *Umbella* longipedunculata, globosa, 25–30-flora, 1–1·5 cm. diametro, 4–5 bracteis ovatis caducis involucrata; pedunculus axillaris, 2·5–3·5 cm. longus, pubescens. *Flores* luteoli, parvi, 2 mm. longi, primum dense pubescentes, diu fere glabri; pedicelli puberuli, 3 mm. longi, post anthesin elongati, medio articulati. *Calycis* campanulati laciniae 5, aestivatione apertae, primum irregulariter inflexae, tandem erectae, ligulatae, apice rotundatae, tubum bis excedentes. *Petala* 5, cum calycis laciniis simillimis alternantibus specie in serie una inserta. *Stamina* 5 erecta, sub anthesi calyce paullo longiora. *Disci* glandulae quartam partem calycis laciniarum aequantes, apiculatae. *Ovarium* ellipticum, ad basin apicemque angustatum, superne in stylum integrum ovario paullo breviorem angustatum, pilis longis lanosis vestitum, imperfecte 3-loculare, stylo glabro apice rotundato; ovula in loculorum basibus per paria erecta. *Capsula* e calyce longe exserta, elliptica, in stylum abrupte angustata, praeter stylum 6–9 mm. longa, breviter velutina, unilocularis; valvae 3, coriaceae. *Semen* unicum, anguste ellipticum, 4–5 mm. longum, brunneum, in placenta centrali post anthesin elongata 2 mm. longa ovulis abortivis et septorum vestigiis coronata sedens.

China. Yunnan: Mengtze, S. Mountain Forests, 1800 m., *Henry*, 10,741; Kweichau: Long-Ly, *Cavalerie*, 2995; Kiang-ouang: Pin-fa, *Cavalerie*, 2353; Majo, *Cavalerie*, 3313.



1. Portion of twig with inflorescence (nat. size).
2. Late stage of flower (× 5).
3. Ditto (× 8) laid open after removal of gynoecium.
4, 5. Front and back of upper part of stamen (× 12).
6. Cross-section of upper portion of ovary (× 7), some time after fertilisation, showing six ovules surrounding the top of the placenta (compare n. 8), one of them already predominating, and the three partial dissepiments.
7. Young ovary (× 40) laid open showing the six ovules about the time of fertilisation before the upward growth of the placenta and separated into pairs by the partial dissepiments.
8. Advanced placenta (× 10) removed from the ovary, bearing fragments of the bases of the partial dissepiments torn off in its upward growth and the ovules at the same stage as in n. 6.
9. Capsule (× 4) dehiscing and showing the single seed and some undeveloped ovules borne on the columnar development of the basal placenta.
10. Longitudinal section of a seed (× 6) showing the minute basal embryo.

Dipentodon, as has been mentioned, is characterised by a combination of structural peculiarities that does not find an even approximate counterpart in any other genus known to me, and the discovery of the Natural Order to which it is most nearly allied has therefore presented considerable difficulties. The situation has, moreover, been complicated by the ambiguous character of

the outer floral whorl and of the androecium. The outer covering of the flower appears at first sight to have 10 similar ligulate teeth, and these may be regarded as 5 sepals and 5 petals or as 10 sepals, the petals being absent. The staminal whorl is also capable of two explanations, according as the 5 glands alternating with the stamens are considered to be reduced members of a decamerous androecium or merely as projections of the disc.

The ten teeth of the perianth though quite similar and apparently in one row can, in the young bud, be distinctly seen to form an inner and outer whorl and even up to maturity the edges of five of the teeth are slightly within those of the alternate ones. It may be said therefore that these two whorls represent a calyx and a perigynous corolla. The position of the stamens opposite to the outer members or calyx segments is in accordance with that view.

The diagnosis of the genus has been drawn up upon the above interpretation of these whorls and will allow of its being placed provisionally in *Celastraceae* near *Tripterygium* with which it is in close agreement regarding ovary characters.

It is true that *Dipentodon* differs in several structural points from the greater part of the *Celastraceae* but each peculiarity is shared by one at least of the genera comprised by Bentham and Hooker in that Natural Order. The similarity of the calycine whorl to the corolla and their open aestivation is paralleled by some species of *Perrottetia* : the five glands of the disc, if taken to represent a step towards a decamerous androecium throw light upon the position of *Glossopetalum*, which, with its ten stamens, has hitherto held an unique position in the Natural Order ; the septicidal dehiscence of the capsule is unusual but closely resembles that of *Microtropis* and perhaps of other allied genera in which a single seed results from a plurilocular ovary ; the curious growth of the placenta beneath the six basal ovules, in consequence of which the seed is at length borne on a short stalk within the capsule is similar to that which occurs in *Kurrimia* ; the stipules and the umbellate inflorescence agree with the monotypic S. American genus *Goupia*.

If *Dipentodon* is rightly placed in *Celastraceae* at all, it is only in consequence of its connection with the main body of that Natural Order through the genera *Tripterygium*, *Perrottetia*, *Kurrimia* and *Goupia*. These differ among themselves as much as they do from the greater part of the rest of *Celastraceae*, and it is among the isolated groups which they form on the fringe of the Order that *Dipentodon* may be provisionally left.

The anatomical characters have been examined by Mr. Boodle but do not appear to give any clear indication of the affinities of the genus.

XLI.—DIAGNOSES AFRICANAE: XLIV.

1281. **Mesembryanthemum oculatum**, *N. E. Brown* [Ficoideae-Mesembryeae] ; affine *M. viridifloro*, Ait., sed ramis multo brevioribus, foliis confertioribus, floribus albis rubro-oculatis differt.

Herba perennis, subcaespitoso-ramosa, papulata, ramis 2–6 cm. longis procumbentibus. *Folia* 0·7–3 cm. longa, basi 4–6 mm. lata, deinde ad apicem obtusum angustata, supra leviter concavo-

canaliculata, obtusissime vel tessellato-papulata, glabra, viridia. *Flores* terminales, solitarii, brevissime pedunculati. Calyx inaequaliter 5-lobus; tubus obconicus, papillosus (nec papulatus); lobi deltoideo-ovati, papulati. *Petala* laxe multiseriata, exteriora 1 cm. longa, linearia, acuta, radiata, interiora gradatim breviora, intima erecta, staminodiiformia, omnia alba, basi rubra. *Stamina* erecta, stylis longiora, antheris luteis.

South Africa. Described from a living plant, which flowered at Kew in June, 1911, collected during the Percy Sladen expedition to Little Namaqualand in 1910 by *H. H. W. Pearson*, 6172.

1282. **Dicliptera Rogersii**, *Turrill* [Acanthaceae-Acanthoideae]; affinis *D. micranthae*, Nees, sed bracteis bracteolisque dense glandulosis, corolla majore, seminibus laevibus valde distincta.

Caulis erectus, ramosus, parce pubescens, angularis. *Folia* pauca, lanceolata, apice acuta, parce vel in nervis densius pubescentia, petiolis 0·5 mm. longis. *Cymae* capitatim congestae, subglobosae vel ovoideae, multiflorae, in ramis terminales et paucae distantes axillares, quasi in paniculam laxam subdivaricatam collectae; bracteae oblongo-spathulatae, acuminatae, 8 mm. longae, 1·5 mm. latae; bracteolae lanceolatae, 6 mm. longae, 0·75 mm. latae, bracteis bracteolisque dense glanduloso-pubescentibus. *Calycis* lobi 5, lineares, acuti, 4 mm. longi, minute pubescentes. *Corollae* tubus cylindricus, 9 mm. longus, 1 mm. diametro, extra parce pilosus; labium posticum integrum, 6 mm. longum, 4 mm. latum, anticum trifidum, 7 mm. longum, 3·5 mm. latum. *Stamina* 2, filamentis exsertis 10 mm. longis fere glabris; antherarum loculi 2, superpositi, subglobosi; pollinis granula ellipsoidea circiter 40 μ longa. *Discus* 0·75 mm. altus. *Ovarium* ad 1·5 mm. altum, 0·75 mm. diametro, glabrum, loculis 2-ovulatis. *Stylus* 1·6 cm. longus, glaber. *Capsula* 5-6 mm. longa, 1·5 mm. lata, apice minute glandulosa. *Semina* 4, orbicularia, laevia.

Tropical Africa. Mozambique District: N.-W. Rhodesia; Kalomo, *Rogers*, 8249.

1283. **Phyllanthus Dusenii**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; affinis *P. Welwitschiano*, Muell. Arg., sed caulibus alatis, foliis lineari-lanceolatis et sepalis oblanceolato-spathulatis differt.

Caules circiter 30 cm. alti, e rhizomate perenni orti, paullo flexuosi, puberuli, internodiis approximatis 5 mm. longis; ramuli floriferi caulium apices versus conferti, patuli, usque ad 13 cm. longi, conspicue alati, minute puberuli. *Folia* lineari-lanceolata, basi rotundata vel subcuneata, apice minute mucronata, 1·3–2 cm. longa, 3–6 mm. lata, membranacea, utrinque glabra, nervis lateralibus utrinque 7–9 prope marginem arcuatis subtus prominentibus; petioli paullo crassi, 1 mm. longi, glabri; stipulae elongato-lanceolatae, acutissimae, 2·5 mm. longae, glabrae. *Flores* monoici, solitarii, ♂ numerosi in ramulis inferne dispositi, ♀ solitarii in axillis foliorum superiorum dispositi; pedicelli breves, ♀ leviter alati. *Flores* ♂: *Sepala* 6, oblanceolato-spathulata, 1-nervia, marginibus membranaceis, 2·5 mm. longa. *Disci glandulae* 6, parvae, prominenter verrucosae. *Stamina* 3, filamentis in columnam longam gracilem connatis; antherae inter se liberae, loculis parallelis contiguis longitudinaliter dehiscentibus. *Flores* ♀: *Sepala* maris sed longiora, 4 mm. longa, 1 mm. lata. *Discus* parvus, annularis,

paullo undulatus, glaber. *Ovarium* subglobosum, laeve, leviter stipitatum ; styli erecti, basin versus connati, bifidi vel fere bilobi, apicibus non incrassatis. *Capsula* matura non visa.

Tropical Africa. Upper Guinea : Cameroons ; without precise locality, *Dusén*, 296.

1284. Phyllanthus Gossweileri, *Hutchinson* [Euphorbiaceae-Phyllantheae] ; affinis *P. omahakensi*, Dinter et Pax, caulibus laevibus, stigmatibus non incrassatis differt.

Herba annua, circiter 30 cm. alta ; caulis et rami teretes, glabri ; ramuli floriferi elongati, usque ad 15 cm. longi. *Folia* lanceolata vel oblongo-lanceolata, basi paullo rotundata, apice acuta, 6–12 mm. longa, 2–3 mm. lata, crassa, utrinque glabra et opaca, nervis lateralibus utrinque obscuris ; petioli brevissimi ; stipulae subulatae, 1 mm. longae. *Flores* monoici. *Flores* ♂ basin versus ramulorum 2–3-nati, axillares. *Sepala* 6, obovata-elliptica, apice rotundata, glabra, marginibus leviter membranaceis. *Disci glandulae* 6, parvae, rotundatae, laeves. *Stamina* 3 ; filamenta connata ; antherae liberae, loculis subparallelis longitudinaliter dehiscentibus. *Flores* ♀ in axillis foliorum superiorum solitarii ; pedicelli 2 mm. longi : *Sepala* 6, oblongo-elliptica, apice rotundata, marginibus membranaceis, 2·5 mm. longa, 1·5 mm. lata, integra, glabra. *Discus* parvus, paullo 5–6-lobatus. *Ovarium* leviter lobatum, laeve ; styli ascendentes, bilobi, apice non incrassati. *Capsula* paullo depresso-globosa, 4 mm. diametro, laevia. *Semina* 2 mm. longa, dorso longitudinaliter 8-striata.

Tropical Africa. Angola : Kassuango Kurini, a weedy herb occurring here and there in open thickets, *Gossweiler*, 4198.

1285. Phyllanthus Kaessneri, *Hutchinson* [Euphorbiaceae-Phyllantheae] ; affinis *P. sepiali*, Muell. Arg., sed filamentis liberis differt.

Frutex, ramis teretibus cortice cinereo-fusco ; ramuli floriferi fasciculati vel rare solitarii in ramis pulviniformibus producti, gracillimi, teretes, glabri, folios circiter 5-jugos gerentes. *Folia* obovata vel obovato-elliptica, apice rotundata et interdum leviter emarginata, basi subcuneata, 5–8 mm. longa, 3–5 mm. lata, tenuissime chartacea, in sicco supra flavo-brunnea, subtus glauca, utrinque glabra et conspicue reticulata, nervis lateralibus utrinque 4–5 utrinque distinctis ; petioli 0·5 mm. longi, glabri ; stipulae oblique lanceolatae, rubrae, petiolis aequilongae, marginibus laceratis. *Flores* monoici, ♂ solitarii, ♀ bini in axillis foliorum ; ♂ pedicelli graciles, 4–6 mm. longi, glabri, ♀ robustiores, 2 mm. longi. *Flores* ♂ : *Sepala* 6, distincte 2-seriata, exteriora parva, ovata, obtusa, interiora obovata, 1 mm. longa, 0·75 mm. lata, omnia carnosa vel coriacea, 1-nervia, glabra. *Disci glandulae* 6, leviter stipitatae, carnosae, rotundatae, laeves. *Stamina* 3, ad basin libera ; filamenta gracilia ; antherarum loculi divergentes. *Flores* ♀ : *Sepala* maris. *Discus* annularis, subinteger. *Ovarium* ovoideum, leviter lobatum, laeve ; styli suberecti, e basi liberi, bilobi, lobis linearibus apice non incrassatis. *Capula* non visa.

Tropical Africa. British East Africa : Pemba River, *Kässner*, 356.

1286. **Phyllanthus leucocalyx**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; affinis *P. niruroidi*, Muell. Arg., a quo disco floris ♀ crenulato, stigmatibus globosis recedit.

Caules graciles, lignosi, teretes, glabri; ramuli floriferi graciles, elongati, ad 15 cm. longi, teretes, glabri. *Folia* oblonga vel oblongo-elliptica, apice conspicue mucronata, basi obtusa et leviter rotundata, 6–8 mm. longa, 2–3·5 mm. lata, tenuia, marginibus recurvatis, utrinque glabra, nervis lateralibus utrinque 5–6 subtus distinctis supra obscuris; petioli brevissimi; stipulae subulato-filiformes, 2 mm. longae. *Flores* monoici, ♀ in axillis superioribus solitarii, ♂ in axillis inferioribus circiter 3-nati; pedicelli breves, glabri, ♀ quam ♂ robustiores. *Flores* ♂: *Sepala* 5, obovato-elliptica, late 1-nervia, glabra. *Disci-glandulae* 5, magnae, planae, conspicue verrucosae. *Stamina* 3; filamenta in columnam gracilem connata; antherae inter se liberae. *Sepala* ♀ quam maris majora, penninervia, obovato-elliptica, 3 mm. longa, 1·5 mm. lata, glabra. *Discus* tenuis, crenatus, glaber. *Ovarium* globosum, conspicue verrucosum; styli erecti, longi, graciles, bilobi, stigmatibus globosis. *Capsula* 3 mm. diametro, superne valde verrucosa. *Semina* dorso arcte 14-sulcata.

P. rotundifolius, var. *leucocalyx*, Muell. Arg. in DC. Prod. xv., pt. 2, p. 406, partim.

Tropical Africa. Zanzibar, *Hildebrandt*, 1042a*; German East Africa: Pangani, *Stuhlmann*, 185; Rovuma Bay, *Kirk*; Nyika Country, without precise locality, *Wakefield*.

This species is easily distinguished from *P. rotundifolius*, Klein ex Willd., with which it was associated by Müller, by the long, slender styles, globose stigmas and warted ovary.

1287. **Phyllanthus parvus**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; ab omnibus speciebus africanis adhuc descriptis foliis linearibus, staminibus 2 valde distinctus.

Annua parva, 10 cm. alta; caulis gracilis, teres, ruber, glaber; ramuli floriferi ad 4 cm. longi, subteretes, glabri. *Folia* linearia, subacuta, 8–10 mm. longa, 1·5–2·5 mm. lata, membranacea, supra viridia, subtus pallide rubra, marginibus recurvatis rubris; petioli breves; stipulae subulatae vel fere filiformes, 1 mm. longae, integrae. *Flores* monoici, axillares, breviter pedicellati, ♀ in axillis superioribus solitarii, ♂ in axillis inferioribus 2–3-nati. *Flores* ♂ parvi: *Sepala* 5, obovata, integra, glabra. *Disci glandulae* 5, parvae, rotundatae, fere laeves. *Stamina* 2; filamenta ad apicem connata; antherae oblique dehiscentes. *Flores* ♀: *Sepala* 5, uniseriata, oblanceolata, acuta, 1·5 mm. longa, glabra, costa lata, marginibus membranaceis serrulatis. *Discus* patelliformis, tenuis, leviter undulate lobatus, glaber. *Ovarium* subglobosum, paullo lobatum, laeve; styli breves, patuli, bifidi, stigmatibus non incrassatis. *Capsula* depresso-globosa, 2 mm. diametro. *Semina* dorso laevia.

Tropical Africa. German East Africa: between Lakes Tanganyika and Rukwa, about 1830 m., *Nutt*.

1288. **Phyllanthus Paxii**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; affinis *P. glaucophyllo*, Muell. Arg., foliis minoribus acute mucronatis, sepalis 5, filamentis connatis differt.

Suffrutex; caules erecti, gracillimi, lignosi, teretes, glabri; ramuli floriferi distantes, usque ad 11 cm. longi, gracillimi, teretes,

glabri. *Folia* lanceolata vel elliptico-lanceolata, utrinque angustata, apice acute mucronata, 4–12 mm. longa, 2–4 mm. lata, tenuiter chartacea, utrinque glabra, nervis lateralibus utrinque circiter 11 subtus conspicuis ; petioli 1 mm. longi, paullo carnosi ; stipulae subulatae, quam petioli paullo longiores. *Flores* monoici, axillares, ♀ solitarii, ramulorum apices versus pauci, ♂ geminati in axillis inferioribus dispositi ; ♂ pedicelli graciles, breves, ♀ robusti, apicem versus incrassati, circiter 4 mm. longi, glabri. *Flores* ♂ : *Sepala* 5, oblongo-elliptica, obtusa, 1·5 mm. longa, inconspicue 1-nervia, marginibus membranaceis. *Disci glandulae* 5, parvae, prominenter verrucosae. *Stamina* 3 ; filamenta connata ; antherae leviter connatae, loculis parallelis longitudinaliter dehiscentibus. *Flores* ♀ : *Sepala* 5, ovata, obtusa, 3 mm. longa, 1·5 mm. lata, paullo coriacea, glabra, marginibus membranaceis integris. *Discus* patelliformis vel cupularis, tenuis, margine crenulatus. *Ovarium* profunde lobatum, laeve ; styli leviter divergentes, profunde bifidi, stigmatibus non incrassatis. *Capsulae* maturae non visae.

Tropical Africa. North Nyasaland, *Whyte*.

1289. **Discoglypremna**, *Prain*, gen. nov. [Euphorbiaceae-Crotoneae] ; genus distinctum *Malloto*, Lour., quam maxime affine, differt tamen antheris more *Poladeniae*, Thw., prope apicem dorsifixis, filamentis glandulis receptacularibus interstaminalibus immixtis, antherarum loculis distinctis intus locello minore consociatis a connectivo conico prominente pendulis ; a generibus ambobus ob discum hypogynum manifeste evolutum facillime sejungendum.

Flores dioici, apetali. Fl. ♂ : *Calyx* in alabastro globosus, clausus, per anthesin valvatim 5-partitus. *Stamina* 7–8, receptaculo convexo affixa, filamentis liberis glandulis plurimis apice hirsutis consociatis ; antherae prope apicem dorsifixae, loculis distinctis inaequaliter didymis a connectivo prominente conico pendulis, longitudinaliter dehiscentibus. *Ovarii rudimentum* 0. Fl. ♀ : *Calyx* 5-sectus, segmentis valvatis demum reflexis. *Ovarium* 3-loculare ; styli distincti, recurvo-patentes, indivisi, intus fimbriati ; ovula in quoque loculo solitaria. *Discus hypogynus* majusculus, e squamis 6–8 apice hirsutis compositus. *Capsula* 3-dyma, in coccos 2-valves dissiliens. *Semina* ovoidea, arillo pulposo involuta ; testa crassa, dura, nigra, nitidula, foveolata ; tegmen distinctum ; albumen carnosum ; cotyledones suborbiculares, basi parum cordatae, planae.—Arbor. *Folia* alterna, petiolata, glabra, basi trinervia ibique supra minute 2-glandulosa. *Spicae* utriusque sexus ad apices ramorum paniculatae. *Flores* minuti, ♂ secus rhachin glomerati, ♀ sub quaque bractea solitarii ; pedicelli utriusque sexus articulati ; bracteae minutae. *Capsula* parce pubescens.

D. caloneura, *Prain* (sp. unica). *Arbor* 15–20 metralis ; ramuli glabri vel glabrescentes. *Folia* petiolata, alterna, firmula, oblonga vel rotundato-oblonga, saepe breviter caudato-acuminata, basi cuneata vel subrotundata, margine integra vel obscure dentata, 7–10 cm. longa, 5–6 cm. lata, utrinque glabra vel subtus secus nervos parce puberula in angulis intercostalibus subtus foveolata, basi 3-nervia ibique supra minute 2-glandulosa, glandulis puberulis ; petiolus 4–5 cm. longus, parce puberulus, supra canaliculatus. *Flores* subspicati, spicis in paniculas terminales 15–20 cm. longas, 7–10 cm. latas dispositis ; rhachides puberulae. ♂ *Calyx* globosus,

extra puberulus, dein valvatim 5-partitus, 1–1·5 mm. latus. *Stamina* 7–8, filamentis gracilibus apice subulatis longe exsertis, glabris, glandulis receptacularibus plurimis plus minusve inaequalibus apice hirsutis consociatis ; antherae prope apicem dorsifixae, loculis distinctis 2-locellatis a connectivo prominente conico pendulis, locellis inaequalibus introrsis minoribus. ♀ *Calyx* extra puberulus, 5-sectus, segmentis valvatis reflexis. *Ovarium* 3-loculare, hirsutum ; styli distincti, indivisi, recurvo-patentes, intus fimbriati ; ovula in quoque loculo solitaria. *Discus hypogynus* distinctus, e squamis 6–8 crassis latis contiguis margine hirsutis compositus. *Capsula* 3-dyma, 6–7 mm. lata, in coccos 2-valves dissiliens, parce pubescens. *Semina* ovoidea, arillo pulposo involuta ; testa dura, crassa, nigra, nitidula, foveolata.—*Alchornea caloneura*, Pax in Engl. Bot. Jahrb. xliii. 81.

Tropical Africa. Upper Guinea : Gold Coast ; Ancobra River, *Johnson*, 919. Southern Nigeria ; Lagos, *Lamborn*, 123. Cameroons : Bipindi, Mimfiaberg, *Zenker*, 2113, 2643, 3322. Lower Guinea : Spanish Guinea ; Fang, *Tessmann*, 97 ; Bebao, *Tessmann*, 702.

1290. **Sclerodactylon**, *Stapf*, gen. nov. [Gramineae-Festuceae] ; affinis *Eragrosti*, sed spiculae densissime in spicis rigidis secundis digitatis rhachi triquetra apice nuda munitis imbricatae.

Spiculae ovatae vel ellipticae vel lineares, a latere admodum compressae, arcte imbricatae, alternae, sessiles vel subsessiles in rhachi spicae secundae ; rhachilla tarde disarticulata. *Anthoecia* numerosa, hermaphrodita, arcte imbricata. *Glumae* inaequales, durae, 1-nerves, carinatae. *Valvae* ovate, acutae, integrae, muticae vel mucronulatae, durae, 3-nerves interdum utrinque nervo tenui addito, carinatae. *Paleae* valvas subaequantes, alato-carinatae. *Lodiculae* 2, obliquel ate cuneatae, nervosae. *Stamina* 3. *Ovarium* oblongum, glabrum ; styli inferne incrassati, ima basi in stylopodium crassiusculum persistentem connati, caeterum gracillimi ; stigmata angusta, plumosa, sub anthoecii apicem lateraliter exserta. *Caryopsis* in anthoecio maturo paulo mutato inclusa, subtriquetro-ellipsoidea, stylopodio coronata, pericarpio tenuissimo (toto ?) separabili, testa tenui brunnea. Embryo circiter $\frac{1}{3}$ seminis aequans, scutello elliptico basi ultra radiculam producto, epiblasto lato, truncato.—*Perenne*, densissime caespitosum. *Folia* rigida laminis cylindricis nisi ima basi canaliculatis. *Spicae* densissimae, 2–3 ad apices culmorum digitatae, rhachi triquetra apice nuda.

Species unica Madagascariensis.

S. **juncifolium**, *Stapf*. *Gramen* fere totum glaberrimum. *Rhizoma* breve, radices crassas spongiosas edens. *Culmi* arctissime approximati, simplices vel parcissime ramosi, inferne compressi, superne teretes, duri, 25–50 cm. longi (spicis demptis), 2–3-nodi. *Folia* pleraque basalia ; vaginae firmae, 6–8 cm. longae, basales culmum arcte amplectentes, a latere magis minusve compressae, dorso rotundatae, laevissimae, arcte nervoso-striatae, caulinae similes, nisi subteretes ; ligulae breves, rotundato-truncatae, pubescentes ; laminae longe subulatae, cylindricae vel magis minusve compressae (sectione transversa elliptica), ima basi canaliculatae, apice pungentes, 20–40 cm. longae, ad 2·5 mm. diametro, praeter margines partis canaliculatae asperulas laevissimae, glaberrimae. *Spicae* subsessiles 5–10 cm. longae, rigidissimae, rhachi dorso carinata ; pedunculi

rudimentarii griseo-pubescentes. *Spiculae* ambitu valde variae, lanceolatae vel oblongae vel ellipticae vel ovato-ellipticae, 7–15 mm. longae, 3–4·5 mm. latae, a latere valde compressae, 7–20-florae, stramineae, glaberrimae ; pedicelli brevissimi, scaberuli ; rhachilla glaberrima. *Glumae* scariosae, a latere visae oblique lanceolatae, acutae vel subacutae, inferior 2–3 mm., superior 3–4 mm. longa, carina magis minusve asperula. *Valvae* oblique ovatae, 4·5–5 mm. longae, praeter margines anguste hyalinas durae, carina minute asperula plerumque sub ipso apice in mucronulum excurrente, nervis lateralibus inferne saepe obsoletis superne prominulis et fere ad apicem continuatis interdum utrinque altero tenuissimo interiore addito. *Paleae* alae latae, superne asperulae. *Lodiculae* fere 0·75 mm. longae. *Antherae* oblongo-lineares 2 mm. (vel ultra ?) longae. Ovarium cum stylopodio 1·25 mm. longum ; styli tenuissime capillares, 1·25 mm. longi ; stigmata fere 2 mm. longa. *Caryopsis* stylopodio dempto 2 mm. longa, brunnea. *Embryo* 0·75 mm. longus.

Madagascar. East Coast, without precise locality, *Boivin*, 2291 ; Ambongo, *Perville*, 545 ; Lac Manampetsa, *Perrier de la Bâthie*.

This stands out from *Eragrostis* mainly by its peculiar inflorescence which is very like that of an *Eleusine* or *Dactyloctenium* and probably also by the presence of a marked and persistent stylopodium ; but as the numerous species of *Eragrostis* have not yet been carefully examined in that direction, the latter character may in the future turn out to be less reliable. Bojer's *Eleusine juncea* (name only Hort. Maur. 370) from the mouth of the river Omlahi, somewhat to the north of Lake Manampetsa, is very likely the grass described. It grows there according to him in arid places.

XLII.—MISCELLANEOUS NOTES.

Mr. J. J. Nock, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Curator of the Hakgala Gardens, Ceylon.

* Dr. Harry Bolus.—In the report of a Parliamentary Commission appointed in 1877 to enquire into the condition of the Botanic Garden at Cape Town, the evidence of Dr. Bolus fills several pages. The first question addressed to him—"You are a Botanist?"—elicited a reply which all who knew him will regard as characteristic. He said "I do not call myself a botanist, but I have studied botany in my leisure hours." These words genuinely express the opinion he entertained of himself and his botanical work, not only in 1877 but to the day of his death. He was one of the most unassuming of men and the last to realise that from

* This appreciation of Dr. Bolus has been sent to the Director by Prof. H. H. W. Pearson, South African College, Cape Town, in kind compliance with a request made to him.

the quiet seclusion of his study at Sherwood there emanated an influence which was not confined to the country of his adoption, and was felt by everyone within it who was but slightly interested in the subject to which his best energies were devoted. The idea that for many years past he had been a dominant figure in the botanical world of South Africa was foreign to his mind.

So soon after his death, while we are still not fully conscious of the extent of our loss, we can hardly estimate the relative value and importance of the many aspects of his intellectual activity. In his botanical work we were impressed by his enthusiasm, his industry, his business-like precision of method and accuracy in detail. Like most busy men he was somewhat intolerant of those whose objects in life were less definite or less seriously pursued than his own. But his sympathy and time were always at the disposal of any who could meet him on the common ground of interest in botany or in any other subject of which he had made a study. While his own botanical work was mainly systematic and geographical, and it pleased him to affect to regard other branches of plant investigation with kindly forbearance, he really possessed a deep and lively interest in all parts of the subject. He loved plants and nothing that concerned them failed to appeal to him. He was a man of broad views and wide interests, as is sufficiently betokened by the material objects which he gathered round him and which shared in his solicitude—his fine herbarium, his collection of botanical books, his extensive general library, his old furniture, his collection of pictures.

However sedulously a man of this type shuns the public eye he cannot fail to exercise a far-reaching influence even beyond his immediate circle of kindred spirits. Dr. Bolus' efforts were more particularly directed towards the advancement of the subject whose welfare he had most at heart. The effect which his life and work have produced and will produce in South Africa is not to be ascribed entirely, perhaps not even mainly, to the publications which made his reputation in Europe nor to the unrivalled knowledge which he had so laboriously acquired of the vegetation of South Africa. It rather had its source in the relations which existed for many years between him and numerous botanical correspondents scattered through the country. He was ever ready to give of his best to help anyone to begin or to continue the study of botany. He stimulated many residents in remote districts to interest themselves in the vegetation which surrounded them—with great benefit to themselves and to the increase of knowledge of the flora. One of his most esteemed correspondents, Miss Pegler, whose name is well-known as a successful collector, writes "as you say there is no one to fill his place. So far as I personally am concerned, I could never have done the little collecting which I have done had it not been for his helpful criticism and kind encouragement." These words express a feeling which will be entertained by many who looked to him for advice and assistance in the labours which he had encouraged them to undertake. In a letter addressed to the writer of these lines a few weeks before he died, Dr. Bolus incidentally refers to this part of his life-work when he says: "Over the whole of South Africa from the Cape

Peninsula to the Transvaal and even to Basutoland there have been isolated workers engaged in collecting and investigating the flora of the country, stimulated and assisted, so far as may be, by students in the more populous centres of the southern coast. A great deal has been done in this way, without show, but not without cost, both of time and money, in laying the foundations for further advance." The foundations have been well laid and of the many who have been concerned in laying them, Dr. Bolus was among the chief.

Reviewing the second edition of the "Genera of South African Plants" in 1869, Dr. Bolus draws attention to the fact that this work provided a basis for further investigation, and urges the necessity for a more detailed study of geographical distribution. He points out that the traveller cannot supply the place of the resident observer, and lays stress on the very small area of South Africa which at that time had been at all thoroughly explored. The whole of the Western Province (including the most interesting part of the flora of South Africa) was then known only through the work of the earlier travellers. He seeks to direct the attention of residents to this need for detailed work, and adds in a note that he will be happy to correspond with anyone with a taste for Natural History who may be willing to assist. This appears to be the first published indication of the policy which he pursued with such marked success for the rest of his life. A few years later he became himself a resident in the Western Province, and from that time the study of its flora has actively progressed. His efforts were ably seconded by the late Dr. MacOwan and other observers, with the result that to-day the flora of the Cape Peninsula is probably more thoroughly known than that of any other part of South Africa. He sought further to advance the study of botany in Cape Town by a large financial contribution towards the establishment of a Chair of Botany, called by his name, in the South African College. In the foundation and subsequent growth of what was practically a new department, he took a deep interest, and lost no opportunity of assisting those who were responsible for the conduct of its affairs. He served for some years as a member of the College Council. And now he has entrusted the College with the maintenance and extension of the herbarium and botanical library which embody the results of so large a portion of the activities of a long and strenuous life.

His desire to assist the student who, for lack of opportunity, want of means, or for some other cause, was unable to follow his bent, was not circumscribed by the limits of his own subject. Many students have had cause to realise this, and now it is made public by the directions attached to his munificent bequest to the South African College for the establishment of what will be known as the Bolus Scholarships. In selecting the scholars the authorities are enjoined "to search out those who are really in need of pecuniary assistance to help them carry on their studies; rather to insist on evidence of good moral character, industry and a desire to learn than to be influenced by the evidence of superior mental ability." The same spirit is seen in his careful provision that copies of his own published works are to be supplied at reduced prices to students.

By common consent Dr. Bolus occupied a unique and honoured place among botanical workers in South Africa. His death removes one of the most striking figures from the ranks of her scientific men, and leaves a vacancy which no one man can fill. In the annals of South African Botany his name and his record will be written in large characters. As he himself delighted to recall the doings and discoveries of Thunberg, Burchell, Drège and others of his distinguished predecessors, so future generations of botanists and other seekers after knowledge will revere his memory as of one who during his life conspicuously advanced the study of his science, and in his death ensured the continuance of his life-work and the extension of the benefits of education.

Elliottia racemosa, *Muehl.*—A note on this interesting and extremely rare shrub appeared in the *Bulletin*, 1906, p. 226. At that time we were unable to say anything as to its beauty from direct evidence, as the two plants at Kew (which we believe to be the only ones in Europe) had neither of them flowered. The larger plant of the two, now about seven feet high, has this summer borne a crop of 21 racemes, the first flowers opening on July 24. It proves to be a shrub of great beauty as well as interest and rarity. The racemes are terminal, quite erect, 6 to 9 inches high, 2 to 2½ inches in diameter, the flowers mostly solitary, occasionally in pairs or in threes on the peduncle, which is white and ⅝ to ¾ inch long. Flowers pure white, fragrant, ¾ to 1 inch across; corolla lobes 4, narrowly oblong, obtuse, ultimately much reflexed, free to the base; calyx minute, saucer-shaped; stamens 8, less than half as long as the corolla lobes; style as long as the corolla lobes, in the hooded apex of the lowest one of which the stigma is at first enclosed. The flower-bud is at first erect on the peduncle; as the flowering time approaches it becomes inverted and nodding; but just before the expansion of the petals it rises again and stands out horizontally; and in that position the flower remains. A raceme six inches long bears about 40 flowers.

Elliottia is a monotypic genus and belongs to the *Ericaceae*. Flowering as it does towards the end of July, it would make a delightful addition to flowering shrubs could it ever become common in gardens. But it is almost or quite extinct in its native localities in Georgia, and no successful method of propagating it has yet been devised. Cuttings of the branchlets have several times been tried at Kew without success. The only plants raised have been two from root cuttings, neither of which ever looked like living, although they formed a few roots; both ultimately died. The fruit of *Elliottia* is not known, and it is unfortunate that although artificial fertilisation has been resorted to no fruit has been obtained. Bees have also visited the flowers in great numbers.

W. J. B.

Maerua Gilgii.—With reference to the note on *Maerua angustifolia* (*K.B.* 1911, p. 245), Dr. Hans Schinz writes to point out that in July, 1903, he proposed the new name *Maerua Gilgii* for *Boscia angustifolia*, Harv. (Bull. Herb. Boiss., sér 2, vol. iii., p. 668). This

name, which had been overlooked, should accordingly be adopted for the species in question. Some confusion seems likely to arise, however, with *Maerua Gilgiana*, De Wild., which was published in January, 1903 (Ann. Mus. Congo, sér. 4, p. 180).

T. A. S.

Botanical Magazine for July.—The plants figured are *Viburnum rhytidophyllum*, Hemsl. (t. 8382); *Spiraea Veitchii*, Hemsl. (t. 8383); *Dracocephalum argunense*, Fisch. (t. 8384); *Cucumis metuliferus*, E. Meyer (t. 8385); and *Cypripedium speciosum*, Rolfe (t. 8386).

The *Viburnum* is a very distinct species belonging to the group which includes *V. Lantana*, Linn., and is well characterised by its long oblong-lanceolate coarsely rugose leaves, which are densely clothed on the underside with a white or brown stellate indumentum. The dull yellowish-white flowers are succeeded by an abundance of fruit, which is at first red and finally black. The species has been introduced from Western China by Messrs. James Veitch & Sons, and proves quite hardy at Kew, where the plant from which the material for the figure was obtained is growing.

Spiraea Veitchii is an ally of *S. canescens*, D. Don, and *S. Henryi*, Hemsl., differing from both in having entire leaves glabrous above. It is a native of Central China, and as in the case of the *Viburnum*, seeds were collected by Mr. E. H. Wilson for Messrs. Veitch, in whose nursery at Coombe Wood the plant which furnished the specimen figured was grown.

Dracocephalum argunense is an attractive Labiate for a sunny situation, its large violet-blue white-spotted flowers being freely produced in rather dense terminal racemes. It is very similar to *D. Ruyschiana*, Linn., and is often regarded as a variety of that species, differing chiefly in having much larger flowers. *D. argunense* was first introduced into European gardens in 1822. It is a native of Dahuria, Mandshuria, the Amur region, North China, and Japan, the specimen figured having been grown at Coombe Wood from seed received by Messrs. Veitch from Weichang, in North China.

Cucumis metuliferus, the Horned Cucumber, is widely distributed in Tropical Africa, and has been met with on one occasion as far south as Pondoland, where the species was originally discovered by Drège. The Kew plants were raised from seeds presented by Mr. C. H. Stanton, of Field Place, Stroud, these having been collected at Khartum by Major A. E. Stanton. The fruits of this cucumber are 2½–5 inches long, and are furnished with thick conical spines ¼–½ inch long. When ripe they are a rich scarlet.

The *Cypripedium* is a handsome Japanese species, a plant of which was sent to Kew for identification by Messrs. Bees, Limited, with whom it flowered in June, 1910. It is closely allied to *C. macranthum*, Swartz, and has been cultivated for some years under the name of that species. It differs in having whitish or pale flesh-coloured flowers veined with rose, and a more acute staminode.

Botanical Magazine for August.—The plants figured are *Clusia grandiflora*, Splitg. (t. 8387); *Torenia atropurpurea*, Ridl. (t. 8388); *Landolphia Petersiana*, Dyer (t. 8389); *Mormodes revolutum*, Rolfe (t. 8390), and *Mutisia Clematis*, Linn. f. (t. 8391).

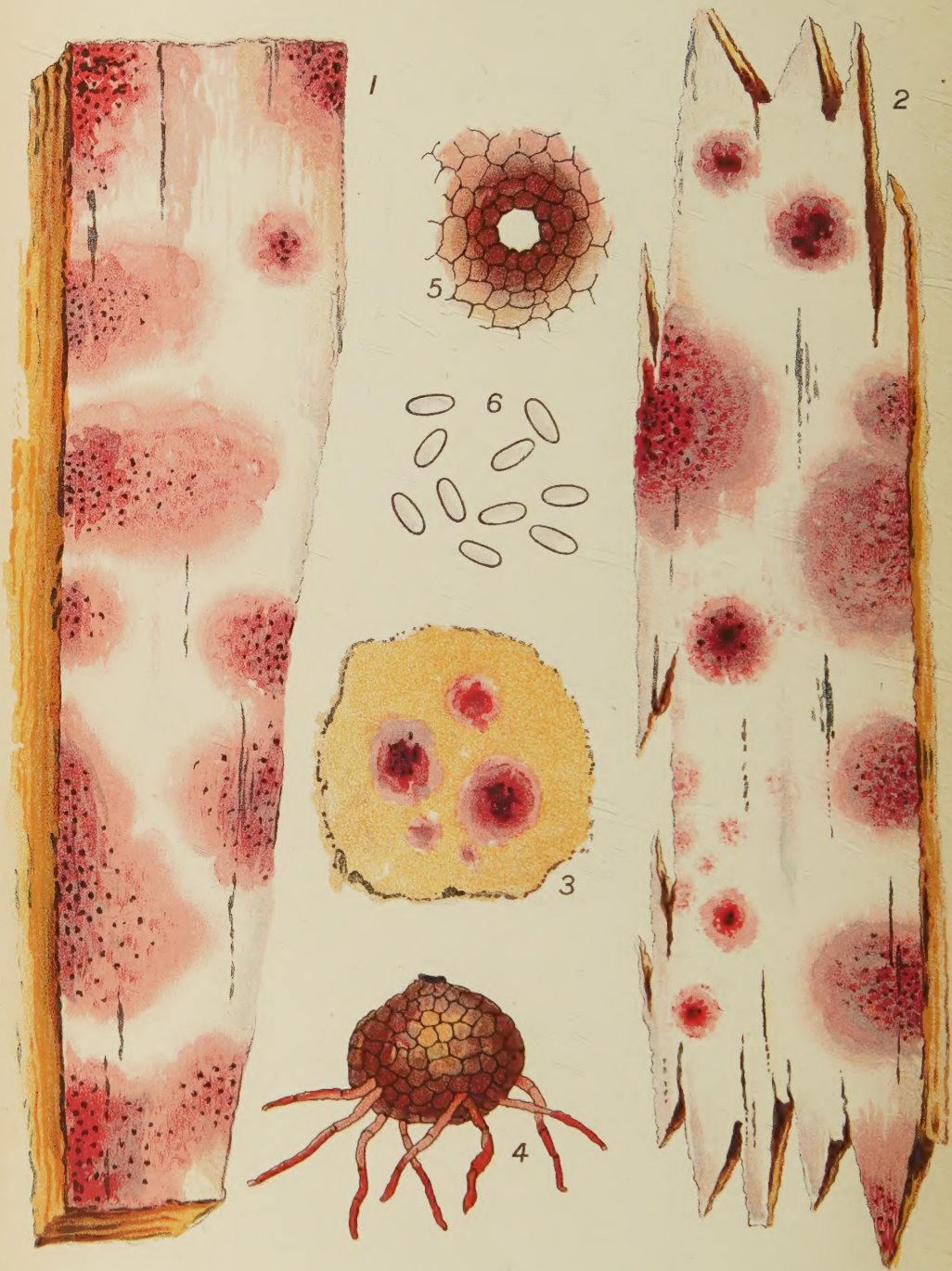
Clusia grandiflora is a native of Guiana, and is figured from material supplied by Mr. R. Irwin Lynch, of the Cambridge Botanic Garden, where the plant has flowered annually for some years past. The flowers are very handsome, the eight petals, which are white with rose-coloured markings towards the base, are 2½ inches long and 2 inches wide. The species, like many of its congeners, is epiphytic, and in a state of nature in many instances ultimately destroys the plant which supports it by strangling it.

The *Torenia* is a very distinct species, remarkable in the shape and colour of its flowers. These are dark purple, and have a long narrow tube. As is commonly the case in *Torenia*, the flowers are very fugitive, but as they are produced freely the species is an ornamental subject for a warm moist house. *T. atropurpurea* is a native of the island of Sumatra and of the central portion of the Malay Peninsula. The Kew plant from which the illustration was prepared was presented by the late Colonel Beddome, who had received the species from Sir Frank Crisp.

Landolphia Petersiana has pure white sweetly scented flowers. A rubber of inferior quality is obtained from its latex. The species is widely distributed in East Africa, and was first introduced into the Kew collections from Zanzibar in 1879, when seeds were received from Dr. (now Sir John) Kirk. The figure was prepared from a plant received from the Jardin des Plantes, Paris, in 1892.

The *Mormodes* is a recent introduction from Peru, whence it was obtained by Messrs. Sander & Sons through their collector, Mr. Forget. It flowered for the first time in cultivation in 1909 at St. Albans. A plant has been purchased for the Kew collection, and from this the material for the figure was procured. The species has showy, cinnabar-red flowers with a yellow lip, and is allied to *M. speciosum*, Linden.

Mutisia Clematis is a handsome climbing Composite from the Andes of Peru and Colombia, having pinnate leaves and large flower-heads, which are conspicuous with their bright red florets. The plant has been grown at Kew for many years, and a fine specimen is at present trained against a pillar in the Himalayan section of the Temperate House.



A Paint-Destroying Fungus.

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Malby & Sons, Lith.